

# THE IRON AGE

New York, Thursday, January 6, 1910.

## The Blake & Johnson Model Factory

The new works of the Blake & Johnson Company, Waterbury, Conn., in the manufacturing suburb of Waterville, embody many of the best features of modern factory construction in adaptations, which in a number of instances are original. The company operates two departments, one for the manufacture of machinery, which shops remain in the city of Waterbury; the other, for the manufacture of hardware specialties, which is housed in the new building.

The factory, an exterior view of which is given in Fig. 1, is 200 x 260 ft. on the main floor, and 12 ft. longer in the basement, extending beneath the loading platform, which is the width of the structure. The building may be considered as having two full stories, the lower being so well lighted as to hardly merit the name of basement. The nature of the machinery requires a very substantial foundation, the equipment including as it does headers, thread rolling machines and other heavy automatic machinery. The founda-

tion to details on the part of the manager. In too many cases the manufacturer leaves everything to his engineers, who, though they may be able men in their profession, are naturally not in touch with the individual conditions which they are to meet. Robert P. Lewis, the company's manager, has devoted a great deal of time and study to the problems confronting him, and, being himself an experienced civil engineer, his efforts were the more intelligently directed.

A flat roof extends entirely around the building for a width of 20 ft. The central portion, as shown in Fig. 3, is covered by eight saw teeth 220 ft. long, each covering the width of a bay. In the New England climate, where there are heavy snowfalls and sudden thaws, this type of roof presents very serious problems. The weight of snow may prove a threatening element if accumulations are not removed. The matter of drainage must be carefully considered. In this case the glass extends from the apex of the saw-tooth to 18 in. above the valley level, giving a practically continuous glass surface 7 x 220 ft. The ventilation

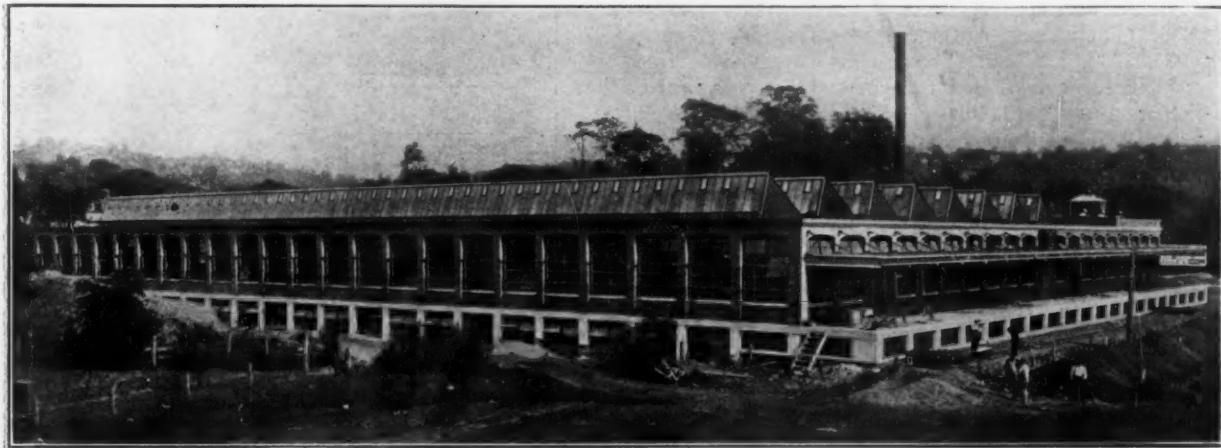


Fig. 1.—Exterior View of the New Factory of the Blake & Johnson Company at Waterville (Waterbury), Conn.

tions, basement walls and floors are of concrete. The upper story walls are of brick with pilasters 20 in. wide only, giving two broad, high windows to each bay. Throughout the plant the effort has been made to secure a maximum and uniform distribution of light. The proportions require a roof of saw-tooth design, and in the basement the use of prismatic glass which deflects the light rays from the windows to the inner area, giving an unexpected degree of illumination.

From the elevations given in Fig. 2, it may be seen that the basement floor is divided by the columns into bays 10 x 20 ft., and the manufacturing floor into bays 20 ft. square, a size which permits of advantageous grouping of machinery, as may be judged from the interior view, Fig. 4. The basement columns are of heavy concrete construction, while those which support the roof are of Southern pine timbers. It will be noticed that the structural steel of the saw-tooth design is somewhat unusual. It is simple and light, and at the same time ample for its purpose. The original plans called for a much more expensive layout, but a careful study of conditions resulted in a great simplification of construction. It affords a striking instance of a large economy coming out of the personal diligence of the owner. In fact, the factory is throughout a fine example of the outcome of the personal atten-

was taken care of by adopting the Anti-Pluvius puttyless skylight and Lowell window operator of the G. Drouvé Company, Bridgeport, Conn. There is a skylight in each third sash, or two to a bay. They are located at the top of the glass, and swing outward and upward. The Lovell system is simple of operation, every ventilator of an entire tooth being opened or closed from one central point. A novelty in the design is the use of a counterweight to offset the weight of the sashes so that they open and close without slam or jar.

The entire roof must be water tight, including the sashes. The chief danger lies within the valleys below the glass. Each section pitches, in alternate direction, to four leader pipes, which carry the water to the drainage system. A plastic slate was chosen to cover the roof, including the valleys, giving an unbroken surface from glass to glass between the teeth. Thus far the material has proved eminently satisfactory.

Experience has shown that it is never necessary to remove by hand the snow accumulating in the valleys of this roof. The system of piping in the factory is an important element in this connection. Hot water, heated by exhaust steam from the engines, passes through coils of pipe located beneath the valleys at the ceiling and melts the snow as fast as it falls, the

water discharging through the leaders which pass down inside of the building. Even should it be extremely cold during a snowfall, with the precautions taken against leakage, it is not anticipated that the unfortunate experiences in some shops with this type of roof construction will be repeated here.

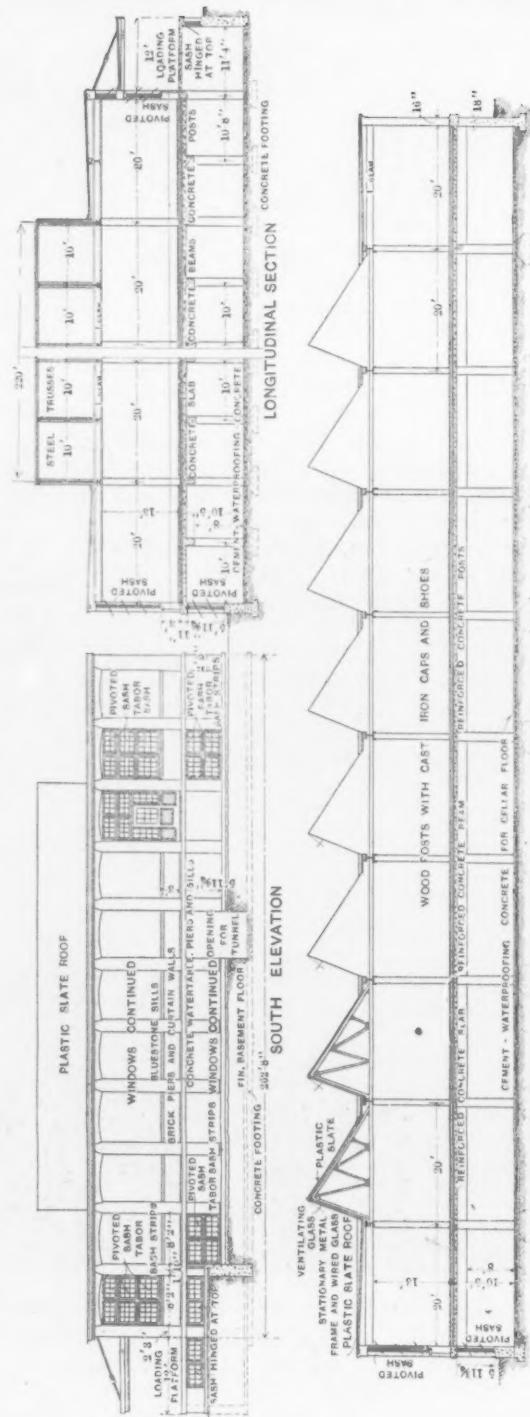
The floor construction is an important feature. The base is concrete. That of the main floor is a 5-in. slab. On it is laid an inch of hot tar and sand, into which is bedded 2-in. hemlock plank. Upon this is a diagonal intermediate flooring and the final surface is a square edged maple flooring. Altogether it is 10 in. thick. The concrete gives the necessary strength and the wood provides for holding down machinery and a better wearing surface than concrete. Between the subfloor and finished concrete floor of the basement is a damp-proof course of felt and hot asphalt.

An innovation in general plating room practice, though one that had already been tried out, was the adoption of a dry floor for the department. It has been claimed by those having experience that a wooden flooring is impracticable. In this new plant the contrary has proved true. Sufficient drainage area about the washing vats serves to take off any overflow or slopping of fluids. The workmen not only strive to keep the floor dry because of the department rules, but have found that it serves their own interests to do so, the new conditions adding greatly to their personal comfort and health.

The sinks and closets for the help have been placed out in the main factory, in groups to best serve the various parts of the great room. No urinals are installed. The closets are equipped with spring seats, which are automatically lifted when not in use. Except in the women's toilets the closets are not screened, which removes the likelihood of loafing, so common in toilet rooms which are out of sight of superintendent and foremen. Greater cleanliness prevails, also, and much attention is paid to the sanitary conditions.

The strictly modern power plant, coupled with the electric drive of machinery, has resulted in a marked economy of operation. Motors are installed on the group system, each line of shafting having its individual drive. Hot water was adopted for the heating system. Beside being a most satisfactory method of heating, the company has considered seriously the installation of a producer gas equipment for its next power unit and the very hot exhaust gases of a gas engine will serve as well as steam in heating the water of the system.

The location of the works has its desirable features. It is on a railroad, a siding from which passes by the loading platform. There is ample space and the outlook from the windows is attractive and restful to



the eye of the worker. The company decided not to use opaque glass in its factory windows, contrary to common practice nowadays to shut off view of the outside, so that the employees may not have their attention distracted. Doubtless this is necessary in neighborhoods where there is a great deal of passing of people or vehicles, but in the country it may be safely abandoned. In fact, anything which adds to the employees' comfort and pleasure in a manufacturing establishment may be considered distinctly advantageous, providing, of course, that it does not interfere with the work. The better air and light, in fact the general wholesomeness of the new shop and its environments, have already brought about an increased efficiency under conditions which otherwise may be considered as essentially the same.

However, the location of the plant has its material disadvantages. A broad brook passes through the premises and provides ample water supply for the

The water accumulates in the drainage pipe until it has reached the level of the overflow, through which it passes to the supply pipe and thence into the power house well. All that is not required for power house and other purposes is discharged by the powerful underwriter firepump over the dike into the stream below.

#### The Iroquois Iron Company to Build Two Blast Furnaces.

Following a meeting of the directors of the Iroquois Iron Company, Chicago, last week, the announcement was made that the company had increased its capital stock to \$3,000,000, and that a bond issue of the same amount had been underwritten. Work will begin at once on the construction of two new blast furnaces on which the company expects to spend \$2,000,000.



Fig. 4.—Interior View of the Factory.

power house and for other industrial purposes without being annoying under ordinary weather conditions, but in times of flood it is a torrent which must be controlled. Rip-rap dikes have been built so that it cannot overflow its banks and reach the factory. The natural contour of the ground, together with the dikes, makes a depressed area about the building. A drainage system has been installed and this, working in conjunction with the water supply system, takes care of any undue accumulations of water which may come with a very severe rain storm or during a sudden thaw.

The supply pipe which carries the water from the stream to a well in the boiler house has its mouth in a screen chamber at the water's edge. A drainage pipe discharges the surface water into the stream below a shallow dam. This pipe crosses the supply pipe at a narrow angle and at a slightly greater elevation. The drainage pipe takes care of all surface water in the area immediately surrounding the factory together with the water from the roof. There is a gate at the mouth of each of these pipes. Connecting the pipes is a by-pass which acts as an overflow from the drainage pipe into the supply pipe. At times of flood the brook water rises above the gates, which are closed.

Their capacity will be 700 tons a day, which with the two furnaces now in operation will give the company an output of 1200 tons daily.

The Iroquois Iron Company has about 50 acres of land around the mouth of the Calumet River and is interested in important iron ore properties in Minnesota and Michigan. It is a Rogers, Brown & Co. furnace company, and its officers are the following: President, M. C. Armour; first vice-president, William A. Rogers; second vice-president, E. L. Billingslea; treasurer, George A. Tripp; assistant treasurer, Charles A. Stillman; general manager, S. A. Kennedy. D. B. Meacham, Cincinnati, resident partner of Rogers, Brown & Co., and D. B. Gamble, Cincinnati, are the remaining directors.

The Page Woven Wire Fence Company, Monessen, Pa., will make some important improvements to its plant, among which will be a large warehouse, 200 x 200 ft., to be used for the storing of wire fencing. The company will also increase its facilities for handling pig iron and scrap, and will install a 5-ton traveling crane with 300-ft. runway, electric magnet, &c.

## NEW IRON AND STEEL WORKS CONSTRUCTION.

### A SUMMARY OF WORK NOW UNDER WAY OR TO BE UNDERTAKEN IN 1910.

**Nineteen Blast Furnaces Building or Planned, with Annual Capacity of 2,650,000 Tons—Open Hearth Steel Plant Partly Completed or Projected That Can Produce 2,850,000 Tons a Year.**

The statement summing up new construction in the iron and steel industries as of January 1, 1910, is far more impressive than the similar statement given in these columns one year ago. Both were designed to take account of blast furnace and steel works plant on which work was in progress at the beginning of the year or was projected. At the beginning of 1909 the United States Steel Corporation subsidiaries were almost the only steel companies having important new work on hand. And with them this work, apart from that at Gary, was for the most part unfinished portions of the programme of new work announced by the Steel Corporation in December, 1906. Delayed by the panic of 1907 and other causes, some of these additions were carried over into 1909 and in a few cases are just now being finished.

This year the conditions are reversed. The programme of the United States Steel Corporation is lighter than it was a year ago, while the independent steel companies have much more new work on hand than at the opening of 1909. A year ago the Steel Corporation had 10 blast furnaces under construction, including six at Gary; to-day it has three furnaces under construction or projected, including two at Gary, which are nearly completed.

The data given below, while not complete to the last detail, represent the important blast furnace and steel works construction now in the hands of contracting engineers and builders or definitely announced to be undertaken in 1910. They show that 19 coke blast furnaces are now building or planned, these being as follows, with their rated annual capacity:

	Capacity. Gross tons.
Indiana Steel Company, 2.....	300,000
American Steel & Wire Company, 1.....	160,000
Republic Iron & Steel Company, 1.....	160,000
Bethlehem Steel Company, 3.....	450,000
Jones & Laughlin Steel Company, 2.....	350,000
Youngstown Sheet & Tube Company, 1.....	175,000
Worth Brothers Company, 2.....	240,000
Corrigan, McKinney & Co., 1.....	120,000
Wickwire Steel Company, 1.....	120,000
Detroit Iron & Steel Company, 1.....	95,000
Rogers-Brown Iron Company, 2.....	240,000
Iroquois Iron Company, 2.....	240,000
 Total.....	 2,650,000

Of the above capacity, 1,835,000 tons is for steel works and 815,000 tons for merchant furnace companies. It is probable that 1,610,000 tons of the above total capacity will be producing pig iron before the end of 1910, while 1,040,000 tons will not be completed before 1911.

In the summation below the new open hearth plants now under construction or definitely planned for erection in 1910 (the completion of a small part of it probably going over to the early part of 1911) represent an annual output of 2,850,000 tons of steel. Considerably more than half this new capacity will be available, it is estimated, before the middle of 1910.

#### UNITED STATES STEEL CORPORATION.

##### Indiana Steel Company.

Six blast furnaces at Gary, Ind., are now in operation, four of these having been blown in in 1909. The remaining two of the eight belonging to the first two

groups will be completed in a few months. The third group of 14 60-ton open hearth furnaces will be completed by the spring of 1910. In the past year the blooming, billet and rail mills have been completed and put in operation. Of five bar mills one has been completed and the others can be finished in a few months. The 14-in. mill is expected to be ready in January. The universal plate mill will be completed probably by the middle of 1910, and the axle mill, which has a capacity of about 60 per cent. of that of the Howard Axle Works, will be in operation in a few months. Work is also in progress on 560 by-product coke ovens, which will have a capacity of 2,000,000 tons of coke a year.

##### Illinois Steel Company.

A notable improvement under way at the South Works of the Illinois Steel Company is a new light structural mill of 24-in. and 18-in. stands. Its capacity is rated at 15,000 tons a month. The mill will be electrically driven, power being supplied by two low pressure steam turbines, using exhaust steam from the reciprocating engines which drive the present structural mill.

##### Carnegie Steel Company.

The most important work this company has on foot is for the erection at Girard, Ohio, of mills for the rolling of steel bars, hoops and small shapes, with a daily capacity of about 1000 tons. These mills will be electrically driven, the power being supplied from blast furnace gas engines at the Ohio works. A full year will probably be required for the completion of the work now planned at Girard, and ultimately it is likely that other finishing mills will be built there. At the Homestead Works of the Carnegie Steel Company changes under way in the 35 and 40-in. structural mills are practically completed. Final work is being done also at the Carrie furnaces on the enlargement of the electric plant which will supply power for the extension to cement plant No. 5 at Universal, Pa.

##### National Tube Company.

A continuous skelp mill which will be electrically driven is under construction at the Lorain, Ohio, works; also two butt weld mills for small pipe. In the past year the last two of the six new 50-ton open hearth furnaces were completed, together with two heating furnaces for the No. 4 skelp mill, four gas producers and an extension to the heating furnace building.

##### American Steel & Wire Company.

A new blast furnace, which will be the fourth at the Central plant, Cleveland, Ohio, was authorized in December. It will have a capacity of 500 tons a day and will have gas blowing engines.

As already announced, plans have been made for a new \$3,000,000 wire plant in the Birmingham District, to be located about a mile southwest of the Ensley Steel Works, and between the latter and the new by-product coke plant to be built at Wylam. The wire rod and wire and nail mills will be electrically driven, power being furnished from an electric power station, in which will be gas engines supplied with coke oven gas. The output will be 400 tons of wire products a day.

**Tennessee Coal, Iron & Railroad Company.**

Two important new projects will occupy this company in the coming year. The first is the construction of a great storage reservoir to hold 2,500,000,000 gallons of water, this supply being secured by damming Village Creek. A 25,000,000 gallon pumping station is also to be built. At Wylam the company has work under way on 280 by-product coke ovens. A new coal mine will be opened and further work will be done in the development of iron mines on Red Mountain. At the Ensley works two additional 75-ton open hearth furnaces are being built, which will give a total of eight, four on each side of the converting plant.

**American Sheet & Tin Plate Company.**

As announced in December plans have been made for large sheet mills at Gary, Ind., on which the outlay will be \$4,500,000. Light plate, jobbing and sheet mills will be erected at once, and later expansion will make this one of the largest plants of its kind in the country.

**American Bridge Company.**

Work will begin soon at Gary, Ind., on two bridge shops with a capacity of 10,000 tons a month. The plant will become in time one of the most important fabricating shops of the company.

**OTHER STEEL COMPANIES.****Jones & Laughlin Steel Company.**

This company has under way at Aliquippa, Pa., the building of three blast furnaces of 500 tons daily capacity each, six Talbot open hearth furnaces, coke ovens, plate and structural mills and tin plate and wire mills. The decision to add tin plate and wire to its products was arrived at by the Jones & Laughlin Steel Company in the early part of 1909. The tin plate plant will contain 30 hot mills, while the wire plant will embrace rod mills, wire nail and wire mills, but full details of the latter project have not as yet been worked out. When operations at Aliquippa were resumed early last year, after being suspended in 1908, they were pushed very actively.

One of the blast furnaces was blown in December 1, the second will be ready late in January or in February, and the third about April. This will be one of the largest and most complete plants in the country for the manufacture of pig iron, steel and the finished lines noted above. Reports have appeared a number of times that the Jones & Laughlin Steel Company had acquired ground at Gary, Ind., and would build another plant at that place. These reports, however, are untrue, as the company has stated that it intends to concentrate its entire manufacturing interests in the Pittsburgh District.

**Republic Iron & Steel Company.**

An important move was made by this company last year in starting to build a plant to enter upon the manufacture of wrought pipe and of open hearth steel. It had previously manufactured skelp for the market and the building of pipe and tube mills was a natural step. Ground was broken at Haselton, Ohio, in the summer of 1909, and the new plant will be ready for operation in March. The open hearth steel plant on which work is in progress will consist of seven 60-ton furnaces (ultimately 12), blooming mill and continuous billet and sheet bar mills. A blast furnace of 450 tons daily capacity is also under construction alongside the three Haselton furnaces of the company. The new steel plant will probably not be ready for operation until late in the present year or in the early part of 1911.

**Inland Steel Company.**

The Inland Steel Company, Indiana Harbor, Ind., following extensive improvements which were made last year, has two 60-ton open hearth furnaces under

construction which are scheduled to be in operation in April. These will give a total of eight open hearth furnaces. This company also has under construction eight sheet mills which, with the 10 mills now in operation, will make one of the largest sheet plants in the country. Three galvanizing pots have been in use for galvanizing sheets and five are to be added. Nearing completion is what is believed to be the largest sheet warehouse in the country, where a full stock of sheets will be carried for the accommodation of the jobbing trade and large consumers.

**Inter-Ocean Steel Company.**

The Inter-Ocean Steel Company, organized in February, 1909, is building a plant at Chicago Heights, Ill., for the manufacture of locomotive and car wheel tires and similar products. Three 40-ton open hearth furnaces are under construction and the company expects to make its first steel in March, 1910. The rolling machinery is of original design and will roll weldless tires or rings of any section desired. Shells for mining machinery will also be rolled, and it is stated that the plant will be equipped to roll the largest rings in the world. W. L. Jacoby is president, F. R. Coates, vice-president; W. V. D. Wright, treasurer; C. C. Warren, secretary, and Julian Kennedy, Pittsburgh, chief engineer. The mill has been designed by Mr. Kennedy.

**Youngstown Sheet & Tube Company.**

Extensive improvements were made by this company in 1909, including three pipe mills and 12 sheet mills—eight hot mills and four cold mills. The sheet mills will be operated in the early part of this year. Work is well under way on a third blast furnace, 22 x 88 ft., with four hot blast stoves and additions to the boiler and engine plant. Another bridge is being provided also for the handling of ore.

**Ohio Iron & Steel Company.**

The Ohio Iron & Steel Company, operating Mary furnace at Lowellville, Ohio, has had in contemplation for some time the building of an open hearth steel plant to consist of six 50-ton open hearth furnaces, with blooming mill and finishing mills. A meeting of the stockholders is to be held on January 20, when it is expected a favorite vote will be had on the proposed plant, and it is the intention to increase the capital stock of the company from \$500,000 to \$5,000,000 to provide money for its erection. It is not improbable that work on the new plant will be started early this year.

**Pittsburgh Steel Company.**

The Pittsburgh Steel Company, which a year ago completed an open hearth plant at Monessen, Pa., containing eight 60-ton furnaces, has plans under way for the building of four more furnaces of the same size, and these will probably be added during 1910. This company is a consumer of pig iron to the extent of nearly 1000 tons a day, and also of heavy steel scrap. It is not improbable that at some time two or three blast furnaces will be built at the steel plant to supply its own metal.

**Bethlehem Steel Company.**

An important programme of blast furnace and steel works construction was undertaken by the Bethlehem Steel Company last year, the estimated outlay being around \$6,000,000. Work was undertaken on three modern blast furnaces, which will adjoin the present furnaces at South Bethlehem. The first of these, on which work was started some years ago and stopped, will be ready in February, and the other two, with 10 hot blast stoves, in the latter part of the year. Two additional sets of ore and coke bins will also be built adjoining those of the existing blast furnace plant. Instead of building a second group of 10 open hearth furnaces at the Saucon plant, as at first proposed, the company decided to adopt the duplex system. The

expectation is that by the building of two 20-ton Bessemer converters, for which contracts were let to the Pennsylvania Engineering Works, New Castle, Pa., the capacity of the combined steel plants can be made nearly double that at present. A new Grey mill will be built, and the company has under way a 28-in. universal mill and a 22-in. bar mill. Announcement has been made also of the closing of negotiations with a German syndicate to build 450 by-product coke ovens in connection with the Bethlehem Steel Company's works, the output to be 3000 tons of coke a day. The investment in ovens, by-product recovery equipment and buildings will be about \$4,000,000. The undertaking is jointly that of the Stettiner Chamotefabrik and the Berlin Anhaltische Maschinenbau-Aktiengesellschaft, and the capital will be supplied by the Deutsche Bank of Berlin.

#### Sharon Steel Hoop Company.

The improvements and additions to the plant of the Sharon Steel Hoop Company at Sharon, Pa., started early in 1909, are still under construction, but are expected to be finished early in 1910. These consist of one additional 35-ton basic open hearth furnace and two additional blooming mill heating furnaces.

#### American Rolling Mill Company.

The extensive programme of steel works and sheet mill additions recently made up by the American Rolling Mill Company, Middletown, Ohio, as reported in *The Iron Age* of December 9, 1909, contemplates the building this year of four 65-ton open hearth steel furnaces and the following rolling mills: A 40-in. blooming mill; 24-in. billet and sheet bar mill, with bullhead stand; two plate mills, 72-in. and 96-in., respectively; two 24-in. sheet and jobbing mills and eight finishing mills, with sheet, pair and annealing furnaces and other auxiliary equipment.

#### Cambria Steel Company.

At the works of this company at Johnstown, Pa., the most important new work in 1910 will be the building of wire rod, wire and wire nail mills, with a capacity of 300 tons a day. Contracts for the buildings, for a continuous rod mill and for the other mills and equipment have already been let.

#### Crucible Steel Company of America.

Among improvements and additions at plants of the Crucible Steel Company of America, Pittsburgh, Pa., are the following: At the Park Works, Pittsburgh, crane runways and electric cranes are being installed over the yard used for storing crude material. A new 20-in. mill is being erected at the La Belle Works, Allegheny, Pa., which will considerably increase the production of implement steels. This improvement includes a new steel building, reheating furnaces, shears and all necessary equipment, including steam plant with mechanical stokers. The company is erecting at the Spring Works, McKees Rocks, Pa., a complete new steam plant equipped with mechanical stokers. The erection at the Atha Works, Harrison, N. J., of a 2500-hp. modern steam plant, equipped with mechanical stokers, has been authorized and a portion of the material is now on the ground ready for erection.

#### Forged Steel Wheel Company.

The above company, which is a subsidiary of the Standard Steel Car Company, is building at Butler, Pa., an open hearth steel plant consisting of six 50-ton furnaces.

#### Basic Steel Company.

The Deforest Sheet & Tin Plate Company, Niles, Ohio, recently completed a new plant consisting of six mills for the manufacture of sheets and tin plate. The Basic Steel Company of Niles, which was incorporated by the same interests, will soon begin the erection of a basic open hearth steel plant with a daily capacity of 500 tons of billets and sheet bars. This company will

supply sheet bars to the Deforest Company, and will sell bars in the open market.

#### Pennsylvania Steel Company.

The Pennsylvania Steel Company has placed orders for a gas engine as an addition to its blast furnace blowing equipment and a low pressure turbo generator set of 1500 kw. capacity. The extensions at the Steelton, Pa., plant last year were chiefly the enlargement of the steel foundry.

#### Lackawanna Steel Company.

The Lackawanna Steel Company, Buffalo, N. Y., is building an additional 60-ton open hearth furnace at its West Seneca plant. It will have an output of about 50,000 tons a year. This will make 12 furnaces, with a total output of 550,000 tons a year. Some alterations are being made also in the company's bar mills.

#### Halcomb Steel Company.

Among improvements made in the past year or now in progress at the plant of the Halcomb Steel Company, Syracuse, N. Y., are the following: New brick buildings, 50 x 240 ft. and 50 x 50 ft., with equipment to increase by 50 per cent. the capacity of the wire department for drawing, cold rolling, annealing and straightening tool and alloy products. Other new brick buildings include one 40 x 80 ft. for a storehouse, one 30 x 60 ft. for roll turning and storage, and a 40 x 40 ft. addition to the building for brick and crucible storage.

#### Wickwire Steel Company.

The Wickwire Steel Company, Buffalo, N. Y., is building a second blast furnace, which will be 21 x 81 ft., and expects to have it ready to blow in in July, 1910.

The connected interest, Wickwire Brothers, Cortland, N. Y., manufacturers of wire products, are enlarging their open hearth plant by the construction of a 30-ton open hearth furnace. The present steel plant, consisting of two 30-ton furnaces, was built in 1903 under the direction of the Wellman-Seaver-Morgan Company, which also has the contract for the additional furnace.

#### Eastern Steel Company.

The Eastern Steel Company, Pottsville, Pa., is building two additional open hearth furnaces of 80 tons capacity each. The company is also equipping its plant to roll 24-in. beams. The expense of the improvements now under way will be about \$300,000. The ingot capacity will be increased to about 24,000 tons a month on the completion of the new work in the spring of 1910.

#### Lukens Iron & Steel Company.

Improvements under way at the plate mills of this company at Coatesville, Pa., include the building of a four-hole soaking pit furnace in the universal mill, the addition of a 10-ton Gantry crane to the yard equipment, and an increase in electric power through the installation of a Rateau-Smoot 750-kw. turbo generator set. Other changes are in contemplation, but details have not as yet been worked out.

#### Upson Nut Company.

On property adjoining its blast furnace, Cleveland, Ohio, the Upson Nut Company is building a steel plant consisting of four open hearth furnaces, 34-in. blooming mill and a bar mill. The blooming mill will be driven by a 46 x 60 in. reversing engine.

#### Worth Brothers' Company.

The blast furnace the Worth Brothers Company is completing at Coatesville, Pa., adjoining its plate mills, will be ready for blast in the next three months. It is 85 x 18½ ft., and is equipped with McClure central combustion stoves. It is of the most modern construction, and in connection is a large ore yard commanded by an Alliance Machine Company ore bridge.

Hot metal will be taken to the open hearth furnaces. A feature of the furnace equipment is a crane runway crossing the cast house transversely, commanding the space in front of the furnace and extending into the yard on either side, permitting the ready handling of brick, clay, runners, &c. A second blast furnace, a duplicate of No. 1, is to be built at once, and foundation work is already completed.

#### MARYLAND STEEL COMPANY.

At Sparrows Point, Md., the Maryland Steel Company is completing an open hearth plant for the manufacture of steel either by the straight open hearth or the duplex process. It consists of five 50-ton tilting furnaces, together with cranes, producer plant, &c. The company is also installing two 7½-ton Brown Hoist rapid unloaders, to operate on 600 ft. of new concrete bulkhead, which is to form the face of the unloading wharf parallel to the line of the blast furnaces, and which will eventually be continued back of the entire furnace plant. Considerable dredging has been necessary, also in providing facilities for the unloading of ore. To care for the additional power required to operate the open hearth department, unloading plant and other improvements, two 750 kw. low pressure turbines are being provided, direct connected to direct current generators. These turbines take the exhaust steam from the Bessemer blowing engines, exhausting it in turn into a Westinghouse Leblanc condenser.

#### SOUTHERN IRON & STEEL COMPANY.

Important new construction is being carried on by the Southern Iron & Steel Company, Birmingham, Ala., most of its energies at present being directed toward the completion of the work at Alabama City, Ala. This plant formerly consisted of one 300-ton blast furnace, four open hearth furnaces and a blooming mill, with two open hearth furnaces partly erected. The two additional furnaces have been completed and the four original ones have been completely overhauled and in a large measure rebuilt. The company has added greatly to the crane facilities of the plant, having under contract a new 100-ton crane with the Alliance Machine Company, Alliance, Ohio, as well as a number of cranes of smaller capacity. The principal new construction, however, is the erection of a new rod and wire mill at the same site. This has progressed as far as the erection of the steel frame for both the wire and the rod mill, with a portion of the former under roof and, at the rate of progress made since December 1, it should be possible to have the entire new work under roof and begin the installation of machinery by February 1. This mill will have a capacity of 500 tons of rods per day. It is to be equipped with three continuous billet heating furnaces. The rod mill power plant, consisting of about 10,000 hp. capacity Stirling water tube boilers, is practically complete, as well as six new Duff gas producers and the three reheating furnaces. Repairs on the blast furnace at Alabama City are completed and the furnace can be blown in as soon as the balance of the plant is ready for the metal. It is hoped that operations may begin throughout the plant by March 1. The principal other work that is incomplete is at the brown ore mines in Bartow county, Ga., where the company has been installing additional washer capacity and opening up new territory. These improvements are likely to be completed in the next 90 days. The blast furnaces at Chattanooga and Trussville are producing and the coal and ore mines of the company are all in operation.

#### MERCHANT BLAST FURNACES.

The Iroquois Iron Company, Chicago, affiliated with Rogers Brown & Co., will begin work at once at its Calumet plant on two new blast furnaces of 350 tons daily capacity each. These will bring the output of this company up to 1200 tons of pig iron a day. The

cost of the new furnaces and appurtenances will be about \$2,000,000.

The Rogers-Brown Iron Company, Buffalo, N. Y., recently formed by Rogers, Brown & Co. interests, announced last week that it would build two new furnaces of 350 tons daily capacity each, adjoining the furnace plant of the Buffalo & Susquehanna Iron Company at South Buffalo, which the new company acquires. The new stacks will not be completed until 1911.

The Detroit Iron & Steel Company is bringing to completion at its Zug Island plant a second blast furnace, 80 ft. high, 12½ ft. hearth and 18½ ft. bosh, equipped with four McKee hot blast stoves and with Allis-Chalmers blowing engines. It will be ready for blast in March or April. Arthur G. McKee, Rockefeller Building, Cleveland, is the engineer.

The Princess Furnace Company, Glen Wilton, Va., is building a furnace 14 x 70 ft., and 8 ft. (hearth) to replace the old stack. An additional hot blast stove 18 x 75 ft. is being built and 500 hp. of Babcock & Wilcox boilers are being added.

The rebuilding of Earlston furnace of Joseph E. Thropp at Earlston, Pa., will give it a capacity of 100,000 tons of pig iron a year. It will be 82 ft. high, 19 ft. 3 in. diameter at the bosh and 12 ft. 9 in. at the hearth. A complete tunnel system for stock is being installed and the skip hoist will be served by an electric larry. The stack is to be equipped with a Ladd & Baker skip hoist, and the Baker-Neumann rotary distributor.

The Andrews & Hitchcock Iron Company, Youngstown, Ohio, blew out its old No. 1 furnace last year and completely dismantled it. On about the same foundation a new furnace has been built, 19 x 80 ft., with 12 ft. hearth and of the latest Julian Kennedy type, with his improved skip hoist. The company has also built four new hot blast stoves of the McClure type, and is equipping its new furnace with a Mullen gas washer, centrifugal pumps, dust catchers, &c. It has equipped the casting house with an electric crane for handling pig iron and carrying it to a Brown pig breaker. The new furnace has been raised about 14 ft. above the ground level of the old one and the company is now finishing all the necessary piping, &c. It hopes to have the furnace in blast in January.

Work is well advanced on a new stack for the Dayton Coal & Iron Company, Ltd., Dayton, Tenn., replacing the No. 1 furnace. It will be 80 ft. high, 18 ft. 3 in. diameter at the bosh and 11 ft. 6 in. at the hearth.

The La Follette Iron Company, La Follette, Tenn., is remodeling its blast furnace, installing externally cooled jackets for hearth and bosh, and reconstructing the top, providing a Baker-Neumann rotary distributor.

Corrigan, McKinney & Co. are completing a new 350-ton blast furnace at Cleveland, Ohio, which will be put in blast about February 1.

Reconstruction work is still in progress at the Secaucus, N. J., furnace of the Hudson Iron Company. The installation of a new blowing engine has just been completed. The work on the stack is progressing, and the furnace may be blown in in four or five months. Meantime the company is making shipments of ore to other furnace companies from its Forest of Dean mine at Fort Montgomery, N. Y. (about 275 tons a day) and its limonite mine at Beattyestown, N. J.

The Empire Steel & Iron Company, Catasauqua, Pa., is introducing an innovation for the United States, in having built by the General Electric Company at Lynn, Mass., for installation at its Oxford, N. J., furnace, a steam turbine driven six-stage centrifugal air compressor. It will have a normal capacity of 22,500 cu. ft. of air per minute at 15 lb. pressure, and is so arranged that the pressure can be automatically increased to a maximum of 25 lb. as conditions require. The installation of this machine will permit of increas-

ing the output of iron to 225 tons a day. This form of blower has been used successfully in England and Scotland and other parts of Europe for several years, and the Oxford furnace management expects to obtain as good results or better with this system, at a much lower cost than with the ordinary form of blowing engine. The new shaft which has been under way for over a year at the company's iron mines at Oxford, has already reached the ore. At its Mount Hope, N. J., mine, two shafts are going down to intersect a body of ore already proved by diamond drill. The mines at Oxford and Mount Hope far exceeded all previous records in 1909. Shipments over the first 11 months amounted to about 200,000 tons of 60 per cent. magnetic ore well suited for the manufacture of basic pig iron. The mechanical and electrical separating plant introduced about 18 months ago has fully met expectations. The Mount Hope mines are supplied with air from two large compressors built by the Ingersoll-Rand Company, and installed with the separating plant. Among changes made at the Catasauqua, Pa., furnaces of the company in 1908 and 1909 were the building of a complete new furnace shell with three Roberts stoves and the installation of two Southwark blowing engines and several batteries of Rust boilers. The output of the new furnace which replaced one built in the early '60s is about 225 tons of foundry iron a day as against 60 tons. Other improvements included the rearranging of the yard system, the building of standard gauge track, the addition of new Baldwin and Vulcan locomotives and a set of Weimer and Treadwell self-cleaning cinder cars. The company's furnaces are now turning out about 21,000 tons of pig iron a month. This will be increased after the middle of January, when another stack will be ready to blow in.

The Thomas Iron Company, Easton, Pa., expects to erect a pig casting machine in connection with its blast furnaces at Hokendauqua, Pa. The work of equipping the No. 3 furnace at Hokendauqua with a Mullen gas washer is now under way. The company has nine available stacks, four at Hokendauqua, two at Hellertown and one at Island Park being in blast. The two furnaces at Alburtis will probably be blown in the next 30 days.

The Wellston Steel & Iron Company, Wellston, Ohio, is installing four Rust boilers at its blast furnace plant, in addition to two put in in the past year. The installation of two blowing engines is under consideration. In the past year the company removed its No. 2 stack entirely and erected a larger one, new from top to bottom, including foundation. Three new fire brick stoves were built for this furnace.

The Alabama Consolidated Coal & Iron Company, Birmingham, Ala., has important extensions under consideration, but has not definitely decided concerning them. The rebuilding of the company's Searles tipple and coal-washing plant, burned July 25, 1909, is the most important recent improvement. Work is now nearing completion, and the company has what it considers the largest and most up-to-date tipple and washer in the South. It can take care of and wash 3000 tons of coal in 10 hours. The machinery is driven by a Lane & Bodley Corliss engine of 400 hp. A pumping station has been completed at the company's Lewisburg mine.

#### ROLLING MILLS AND STEEL FOUNDRIES.

John W. Hubbard, president of Hubbard & Co., Pittsburgh, manufacturers of shovels and railroad track tools, has purchased the plant of the Davison Foundry Company at Chicago. Mr. Hubbard has also bought additional property, and has organized a company known as the Hubbard Steel Foundry Company, with a capital stock of \$300,000. It is the intention to erect additional buildings, and also two open hearth furnaces

for the manufacture of steel rolls and steel castings. John N. Allen, formerly with the Illinois Steel Company and later with the Lackawanna Steel Company, at Buffalo, N. Y., will be general manager.

The Falk Company, Milwaukee, Wis., is installing a Stoughton side blow converter in its steel foundry, and will have it in operation early this year. Five of these converters are now in use in different parts of the country. They differ from the Tropenas converter, chiefly in the fact that the bottom is removable.

The Malleable Iron Fittings Company, Branford, Conn., is greatly increasing the capacity of its steel foundry. Furnaces for the new addition have been designed by Bradley Stoughton, 165 Broadway, New York.

The Southern Steel Casting Company, Chattanooga, Tenn., is building a plant for the production of electric steel castings. Either a Heroult or a Girod furnace will be installed, power being furnished from a hydroelectric plant located on the Tennessee River.

The Columbia Steel Company, Portland, Ore., is building a new foundry at Black Diamond, Contra Costa county, Cal., in which both open hearth and Bessemer steel castings will be manufactured. The main building will be 130 x 260 ft.

A 20-ton open hearth furnace is under construction at the Sharon Foundry Company's steel casting plant at Wheatland, Pa.

The Glasgow Iron Company, Pottstown, Pa., manufacturer of iron and steel plates, has under consideration the erection of open hearth furnaces.

The Garry Iron & Steel Company, Cleveland, decided recently to remove its plant from Cleveland to Youngstown, Ohio, and placed contracts with the United Engineering & Foundry Company for the building of six hot sheet mills, necessary cold mills and other equipment. Iron and steel sheets will be made. Adjoining its sheet mill the company will equip a new plant for the manufacture of conductor pipe, eave trough, metal roofing and siding, metal lath, &c. The manufacturing department will be completed early in the summer and the sheet mills in the fall.

The Standard Steel Company, Cleveland, Ohio, is erecting a plant in Bedford, Ohio, for finishing and polishing black sheets. It is expected that it will be ready for operation early in the spring.

The Interstate Iron & Steel Company at East Chicago, Ind., has a new steel building under construction and will add a 32-in. mill to its equipment for rolling bar iron and soft steel bars.

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D. D. Mann, vice-president of the Canadian Northern Railway Company, is reported in a Toronto newspaper as saying that applications to the city of Toronto for an iron furnace site in Ashbridge's Marsh will be renewed. He states that representatives of a large furnace syndicate and a member of an important United States steel company have been in Toronto looking into the conditions for the establishment of furnaces there. It appears to be Mr. Mann's understanding that if a site can be got in Toronto a German concern will obtain control of the ore sources on the Canadian Northern. The property of the Moose Mountain Iron Mining Company is on that railroad.

Christmas three years ago the American Blower Company of Michigan, Detroit, Mich., inaugurated the custom of presenting to each employee a sum of money proportioned on the basis of a dollar for each year of continuous service. This Christmas the American Blower Company of New York, successor to the Michigan corporation, continued the custom, and in addition gave an illustrated booklet containing a short historical sketch of the firm from its inception in 1881 to the present time.

## November Exports and Imports of Iron and Steel.

The most striking feature of the November report of the Bureau of Statistics of the Department of Commerce and Labor is the increase shown in imports. At last the effects are beginning to be seen of the purchases of foreign iron and steel made in the early fall. The value of the total imports of iron and steel and manufactures thereof, not including ore, was \$3,512,016 in November, against \$2,636,195 in October. The imports of commodities for which quantities are given aggregated 63,917 gross tons, against 34,230 tons in October, 32,166 tons in September, 22,121 tons in August, 29,136 tons in July, 19,402 tons in June, 18,352 tons in May, 17,772 tons in April, 20,714 tons in March, 19,418 tons in February and 19,782 tons in January. The details of the imports of this class of products for November and for the 11 months ending with November are as follows:

### Imports of Iron and Steel.

	November.		Eleven months.	
	1909.	1908.	1909.	1908.
Pig iron.....	34,707	8,489	146,381	81,872
Scrap.....	15,902	281	41,424	4,029
Bar iron.....	2,554	2,764	16,523	18,564
Rails.....	43	350	785	1,671
Billets, bars and steel in forms, n.e.s.....	1,030	1,247	14,400	9,008
Sheets and plates.....	898	259	3,955	2,235
Tin and terne plates.....	8,046	4,647	57,398	56,015
Wire rods.....	439	1,054	9,953	10,557
Structural iron and steel.....	298	654	5,625	2,953
<b>Totals .....</b>	<b>63,917</b>	<b>19,745</b>	<b>296,444</b>	<b>186,904</b>

It is comforting to observe that the exports also showed a gain, as the value of the total exports of iron and steel and manufactures thereof, not including ore, was \$14,434,690 in November, against \$14,249,598 in October. The exports of commodities for which quantities are given aggregated 115,940 gross tons in November, against 111,802 tons in October, 97,393 tons in September, 105,695 tons in August, 100,681 tons in July, 114,751 tons in June, 109,977 tons in May, 100,904 tons in April, 94,523 tons in March, 84,800 tons in February and 70,085 tons in January. The details of the exports of these commodities for November and for the 11 months ending with November are as follows:

### Exports of Iron and Steel.

	Eleven months ending November.			
	1909.	1908.	1909.	1908.
Pig iron.....	9,168	4,875	57,923	41,964
Scrap.....	820	1,008	24,957	20,991
Bar iron.....	627	1,323	12,285	7,675
Wire rods.....	3,382	839	17,780	6,500
Steel bars.....	7,627	3,017	67,097	39,289
Billets, blooms, &c.....	2,715	9,432	101,237	104,284
Hoop, band, &c.....	584	212	3,256	3,885
Steel rails.....	34,569	10,805	246,389	186,267
Iron sheets and plates.....	7,351	3,286	65,614	39,594
Steel sheets and plates.....	10,327	5,221	93,426	53,970
Tin and terne plates.....	740	121	8,197	11,594
Structural iron and steel.....	7,680	6,416	82,153	106,943
Barb wire.....	6,730	6,783	65,235	*27,103
Wire.....	5,778	6,269	71,122	97,088
Cut nails.....	1,432	339	9,231	6,288
Wire nails.....	2,905	1,610	27,669	23,178
All other nails, including tacks.....	497	466	6,750	4,671
Pipes and fittings.....	13,028	9,108	145,374	105,298
<b>Totals .....</b>	<b>115,940</b>	<b>71,130</b>	<b>1,105,695</b>	<b>866,580</b>

\* Figures are for July to November, inclusive.

The imports of iron ore in November were 174,976 gross tons, against 179,505 tons in October, 164,613 tons in September, 209,855 tons in August, 172,316 tons in July, 124,714 tons in June, 97,393 tons in May, 74,782 tons in April, 108,676 tons in March, 61,749 tons in February and 105,233 tons in January. Of the November imports, 84,750 tons came from Cuba, 40-

497 tons from British North America, 39,698 tons from Europe and 10,031 tons from other countries.

The total imports of iron ore for the 11 months ending with November were 1,473,812 tons, against 652,559 tons in the corresponding period of last year, and 1,149,129 tons in the same months of 1907.

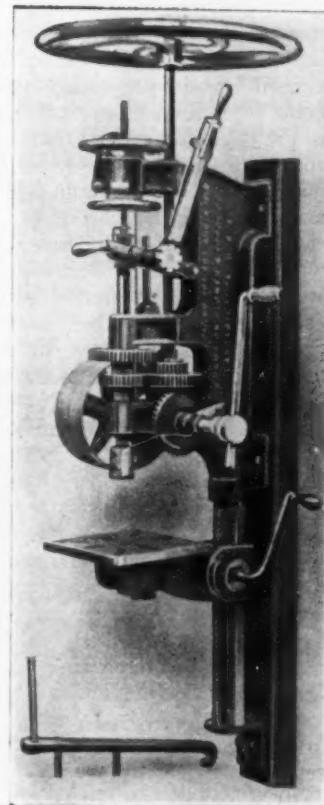
The total value of all the exports of iron and steel and manufactures thereof, not including ore, in the 11 months ending with November was \$142,605,148, against \$138,881,373 in the corresponding period of last year. Similar imports in the 11 months ending with November were, respectively, \$27,028,193 and \$18,247,908.

## An Improved Champion Lever-Feed Drill.

The Champion Blower & Forge Company, Lancaster, Pa., has recently brought out a combination automatic self-feed and double compound lever-feed upright post drill. It is stated that the lever-feed feature is one of the best attachments for high speed drilling ever produced, as the double compound feature of the lever transmits approximately 80 per cent. more pressure to the point of the drill than any other machine.

This lever-feed enables the operator to drill all sizes of holes from the smallest up to 1 in. in diameter, and gives the combination of a hand power drill with either a lever or automatic feed. Both feeds are independent, and the change from one to the other can be made almost instantly. A quick return of the drill and a speedy adjustment for drilling the next hole are provided; there is no necessity for turning either the feed screw nut or the ratchet wheel to back the drill out of the work.

To change from light to heavy work or to vary the speed is but the work of an instant, as these changes are made by sliding the cut gears. Ball bearings are employed to minimize end friction of the drill spindle, with the result that a light and quiet running tool is obtained. It is specially adapted for blacksmith shops, carriage and wagon builders and railroad and machine shops for either hand or combined hand and power operation. The lever-feed also makes the drill a convenient wood boring machine for a blacksmith shop. The table of the drill is raised and lowered by a quick-acting rack and can be swung out of the way if desired. For drilling tires a wheel hanger is provided.



Improved Lever-Feed Upright Post Drill Made by the Champion Blower & Forge Company, Lancaster, Pa.

The Cleveland Foundrymen's Association has decided, beginning with the new year, to hold monthly dinners and business meetings. In the past the association has held only irregular meetings. It is believed that the plan of holding regular and more frequent meetings will prove beneficial to the members.

## EFFICIENCY IN SHOP OPERATIONS.

Methods of Increasing It and Some of the Results Secured by Their Adoption.

BY H. F. STIMPSON.\*

Managers of industrial enterprises will undoubtedly agree that there are few qualities which are more to be desired in equipment, methods and men than that of efficiency. From an extensive study of this subject in various parts of the country, together with interviews and correspondence with several hundred concerns, the writer has become convinced that there is a general lack of definite comprehension of what efficiency is, whence it springs, how it may be measured and developed and the results which its cultivation will produce. The object of this paper is an endeavor to throw some light upon these things and to afford a new viewpoint from which to study industrial operations.

### The Evolution of Industrial Management.

In the first place we must realize that the management of industrial enterprises is in a state of evolution. The tremendous growth of the past few years has caused certain previously satisfactory methods to become inadequate to present needs. Many details which in the days of smaller affairs could be absorbed by personal inspection and mentally stored for use when needed must now, because of their very volume, be made matters of record.

The character of these records has much to do with their value. Because financial records are so ancient they have exerted an undue influence upon the character of all other records. While under our present civilization, the ultimate object of industrial operations is to create financial profits, there are many highly important records which cannot be adequately expressed in terms of money. The business of manufacturing consists of a repetition of mechanical operations. Mechanical operations necessarily involve considerations of weight, distance, time and effort, but not of money.

The reason for the failure of so many cost systems to serve the desired end is that they are based upon a wrong unit. These systems become useful only beyond a certain point. Other systems have been the result of a blind craving for aid, but being without broad underlying principles and not properly tied together and simply, in many cases, disjointed attempts to improve isolated details, they too have failed. The result is that attempts by specialists to improve industrial conditions have been often looked upon with suspicion and this is not altogether without reason. These very failures, however, have drawn the attention of men in certain lines of engineering to the rapidly developing needs of manufacturers. They have attempted to solve the problems by the use of engineering instead of by accounting methods, and the results which have been attained prove conclusively that a material advance has been made.

### What Is Efficiency?

With this understanding of the present conditions, let us consider what efficiency really is. It has been defined as "the ability to produce certain results," and this at the very outset necessitates the existence or creation of a standard of measurement. Our perception of efficiency, therefore, is correct only in proportion to the precision of the standard, which must be accurately developed from data which are not only exact, but complete. A machinist, believed to be operating at high efficiency, was observed while turning a shaft. His cut, feed and speed seemed to be beyond criticism. When the shaft was finished, how-

ever, he had to spend half as much time in hunting up a chain and pad to remove the shaft from the lathe, as he had taken in turning it. This cut his actual efficiency from 100 per cent. down to 87 per cent., yet the man was not at fault. His normal work was to operate a lathe and not to hunt for things which should have been provided for him. The points to be observed here are not only the importance of using the right standard of measurement, but that the efficiency of the man depended very largely upon his surrounding conditions over which he had no control. These conditions depend upon the efficiency of the management in securing proper equipment from the owners. This in turn depends upon the efficiency of the management's records in enabling it to state clearly and accurately what increase in output and consequently in profits will result from improving the conditions—thus justifying the expenditure required. We see from this that the true standard is not the possibility under existing conditions, but that which can be obtained under other and more desirable conditions.

### Managerial Opposition to Change.

The management, which immediately controls the records and conditions, should be the prime source of efforts towards the increase of efficiency throughout the plant. The opposition of managers to progress in this respect is exceedingly great, yet not altogether surprising for these reasons:

1. There is a widespread fallacy that so-called practical experience in the manual operations or technical processes of a business is the chief essential to success in its management. This is due to the fact that perfection of workmanship, of which he knows much, is more important in the eyes of the artisan than the actual cost of the operation, of which he knows little, or than the cause of this cost, of which he knows less.

2. It is only recently that educational institutions have afforded any opportunity for adequate instruction in the art of management, pure and simple, a principal feature of which is the intelligent regulation of cost.

3. There has been, and now is, as a result of these two things, a failure to appreciate the necessity and value of exact data in proper terms, of refined and scientific methods of collecting and using it and of logical reasoning in the solution of industrial problems.

The highest degree of efficiency, therefore, is only to be realized in a shop where executive methods have reached a high stage of efficiency, for in these is unquestionably its source.

### Time Measurement Important.

The first step is to recognize the necessity and value of a proper measurement of time, as a guide not only to the executive but to the workman. A man was observed during eight successive repetitions of the operation of making a machine mold in a foundry. The unit times varied from 5.2 to 23.6 minutes, the total time for the eight being 104 minutes. Under the method of timekeeping in use at that shop it was only ascertained that the eight operations took 13 1/4 hours or an "average" of 13 minutes each, and the labor cost and distribution of burden were made on that basis. Because of the absence of any standard time whatsoever it was not realized that had the man done each of the eight in 5.2 minutes, they would have been completed in 41.6 minutes, resulting in a saving of over 60 per cent. of the total time. Had the man received a

\* Consulting efficiency engineer, 1 Madison avenue, New York.

proper work ticket bearing this standard time, before he began the work, there is no doubt that he could have easily performed the work in the shorter time, and a marked difference in proportionate burden and cost would have resulted. Under the existing methods the management could not know of the waste, and so was helpless to prevent or cure it.

Every item of time, therefore, is capable of division into two parts: A standard or necessary time and a (more or less) preventable waste, which latter is the easier thing of the two to determine.

#### An Example of Increased Efficiency in Riveting.

A gang of four were engaged in riveting some steel plates. By the use of a stop-watch, it was found that a large proportion of the total time of the riveter and bucker-up was not utilized; yet some one was always at work. The reason was that the men proceeded along the work in such a way that the bucker-up covered with his body the holes as yet unfilled by rivets, he moving from left to right. When, therefore, a rivet was driven, these two men had to stand aside until another rivet was placed by the rivet passer. Upon the instruction of the engineer, they reversed the direction of their movements so as to cover only the filled holes, thus enabling the passer always to have a rivet ready for them and making their speed in driving the real gauge of the speed of the operation. Furthermore, when they encountered a hole that needed reaming (as was sometimes the case, until the fault was located with the fitters and remedied), the riveter would lay down the gun, pick up the reamer, ream the hole, lay down the reamer, pick up the gun and drive the rivet. When persuaded to test consecutively ten or more holes after driving the first rivet in a seam to anchor the plates and then to drive the ten consecutively, they progressed faster with less effort. These men, receiving not only a standard from the engineer, but kindly instruction as to how to attain it, and being stimulated, not by abuse, but by a scientifically determined bonus—increased their output over 150 per cent. beyond the original amount.

In this plant, by the use of these methods, and in about seven months, the general increase in efficiency of the men was such that the force was reduced 67 per cent. without reduction in volume of output, but with a great reduction in net total unit cost, even after paying the bonus alluded to and the cost of the expert services which alone produced this result.

#### The Use of Bonuses.

It is proper to say a word here on the subject of bonus as a means of increasing efficiency. The principal merit of this motive lies in the fact that immediate personal gain is the strongest incentive to immediate personal effort. It operates just as strongly on the employee as on the employer. Hope of promotion is too vague and the actual chances too limited to exert much pressure, but an extra sum in the pay envelope—or better still, in a separate one—for the disposal of the "old man himself," will do wonders. To be most effectual a bonus must begin at the point of standard efficiency, but at the point when average efficiency ceases and extra effort begins; and it should increase on a curve faster and faster as the point of standard efficiency is neared, because the accompanying effort will be correspondingly greater.

#### Efficiency Methods and Department Heads.

So much for the individual operator. And now for the executives. From foreman up to and including the highest official the same methods can and should be applied. Under ordinary circumstances, the workman in need of material, tools or instruction keeps his skirts clear by a more or less indefinite and unintelligible request to the foreman. He thinks it the foreman's duty to look after him, but that if he does not do so it's no business of his. Put that man on standard time and

bonus and if there is anything he thinks the foreman should do or get for him he speaks loudly and directly. This the foreman does not resent—as would ordinarily be the case—for his efficiency is determined by the combined efficiency of his men and upon this his bonus depends. Anything, therefore, that interferes with the progress of the men touches him closely, and he will move heaven and earth to eliminate it. All kinds of defects which were previously hidden from the superintendent are now brought to his attention, and he welcomes them for exactly the same reason that actuated the foreman. Thus the change that comes over a shop when efficiency is accurately measured and adequately rewarded is often astounding.

But this is not all. The possession of exact data as to standard and actual times makes possible a certain great improvement in, and addition to, the executive staff and a material increase in the efficiency of the foreman and department heads. By this is meant the installation of a planning department, by which the apportionment of the time of men and machines is controlled.<sup>†</sup> The advantage, indeed, the positive necessity, of the services of engineers and draughtsmen in apportioning the different parts of the product is well understood. The requirements of each part, the strains to which it will be subjected, the kind, quality and quantity of material required to resist these strains, the shapes of the pieces, their relations to each other and many other things are all given most careful attention. The value of fully constructing the design on paper, as a means of discovering possible errors or difficulties, and of correcting or overcoming them before large expense for material and workmanship has been incurred, are too well realized to need more than a simple statement for their acceptance. No sane executive would expect his department heads to take a copy of his customer's order and individually work out the details with which they are particularly concerned and expect the parts to fit. Yet this is just exactly what is being done as regards the apportionment of productive time; and a tumult of broken promises of delivery, excessive costs of production, enormous wastes of time in changing jobs, &c., is the immediate and unavoidable result.

#### What Can Be Done.

It is perfectly possible, but only to one trained in the particular art, to schedule the different operations on all of the different parts of the product; to plot the productive times required, so that each may begin at such a time in relation to the others that all will arrive at the point of assembly at the proper time and in the proper sequence; to combine these studies of the different productive orders on a chart which will show the disposition to be made of all the men and machinery; to prepare advance programmes for each man and machine engaged in productive labor; and thus to give to the superintendent and foremen the advantage of the same predisposition of time that they now have of material.

As it is now, the time of these persons is entirely too much occupied with this problem of the disposition of time for which they are only partly equipped, having, it is true, much of the necessary information, but no training in the scientific handling of it. They are, therefore, unable to devote the time they should to the immediate study of the operations and the provision of tools, material and instruction to the men. They try to be all over the shop at once and they depend on getting their information at first hand, and consequently fail more or less clearly to cover the ground. Having such schedules and programmes as are above described, and with the proper work tickets distributed on a dispatching board, each one in the division representing the work upon which a man or machine is engaged, having the time of commencement

<sup>†</sup> See "Graphical Helps for Apportioning Time in Constructive Operations," *Engineering Magazine*, September, 1909.

and the standard time thereon, the foreman can see at a glance without leaving his office what men will shortly finish their work and what steps must be taken to see that the drawings, tools and materials for their next work are ready for them in time. Having seen to this he has some leisure to give his attention to matters immediately requiring it, knowing, if anything is obstructing the other men, that their anxiety to earn their bonus will cause them promptly to bring such matters to his attention. Having this schedule, moreover, the foremen are enabled to order material, &c., ahead and to do so intelligently, thus making the work of the shop transportation department much simpler. In one case by this means 25 men were able to handle the intra-shop transportation in a more satisfactory manner than 75 men had previously been able to do.

The planning department also greatly aids and is in turn aided by the purchasing department, for the times when material must or can be got can intelligently be determined to their mutual advantage. The sales department, too, when it once gets the idea that the shop is not working miracles, but has its limitations, can make delivery promises which really mean something and can be kept, and this is a trump card of no small importance when the fact becomes realized among the customers of the concern.

#### Responsibility of the Management.

In the opinion of those whose opportunities have enabled them to get at the facts, the inefficiency in manufacturing which undoubtedly generally exists to-day, in spite of the prevailing impression to the contrary, is only about one-fourth due to the things over which the employees have control and three-fourths to conditions imposed upon them by the management. The methods outlined above have achieved results whenever they have been faithfully and honestly tried, with proper co-operation by the management and under the direction of skilled specialists, and the results have continued and will continue as long as the methods are followed. The effect upon the men is that from being often listless, indifferent and antagonistic, they become energetic, ambitious and loyal friends.

One thing more: Much has been done and overdone in the line of so-called welfare work. It is a highly creditable and necessary line of effort, when confined to attempts to remove from the path of the employee any obstacle which prevents him from developing his skill and efficiency to the highest degree. An uncomfortable, unhappy person cannot be efficient. But as steam is necessary to the engine, so is incentive necessary to the worker to get him to make the best use of the facilities provided for him. Under our present civilization, the same incentive which pushes on the master will push on the man, and that is direct personal gain in dollars and cents, not for itself, but for and what that gain will bring. It must come to him quickly after the exertion which its expectation calls forth, for if long delayed, the effect is lost. It must also come to him separately from his regular wage that its amount may be the more readily realized.

Moreover, the results of efficiency methods, within the writer's knowledge, are sufficient to convince him that their general adoption would so increase the purchasing power of the employee, by increasing his wages and decreasing the cost production, as to have a markedly beneficial and steady effect upon the business of the country.

Efficiency methods, however, cannot be successfully designed or installed by those trained in other lines and prejudiced by other associations. After these methods have been scientifically developed to suit the existing conditions and actually put into operation by those skilled in the art, they may gradually be relinquished into the control of those who have been educated in the process of installation, with some hope of success for their future operation.

#### Central and South American Notes.

SAN JOSE, C. A., December 14, 1909.—The law permitting the free importation of equipment for the Bolivia, Uruguay & Minas Geraes Railroad is now in operation. A very wealthy section about 1000 miles square will be reached by this line and its branches. Brazil is trying to attract attention to the Parana and its navigation by light draft steamers. Important business points in the cattle, coffee, maté and cotton regions could thus be reached easily and cheaply, especially in the districts of Santa Chatarina, Paraguay, Rio Grande and São Paulo. In Rio, Santos, Bahia and other cities the merchants are trying to fix a rate for sterling exchange. It fluctuates now between 4.82 and 4.85. Minas Geraes is doing better than ever in metal mining. Of the Central Brazil districts, this one is now in the front rank. The Morro manganese mines have an output of over 50,000 tons yearly. The ore is found in eruptive rock, and it is calculated that there are 5,000,000 tons in sight. The Central Railroad has a branch line to these mines, and new rolling stock will soon give better facilities. According to the Brazilian law on the subject, the San Luis Railroad must be finished (in the State of Maranhão) in three years. A number of bridges are now being constructed on this line. The Brazilian line Norte-oeste will be extended to Corumba and the Bolivian railroad system.

From the Atlantic to the Pacific Ocean in South America by rail will be a practical possibility in some three months, as the Buenos Aires (Argentina) to Valparaiso (Chile) railroad only needs to lay the rails in the tunnel of the Andes for the line of about 1000 miles in length, to be opened for traffic. Then freight landed from American ports at Buenos Aires can be delivered within about 20 hours at Valparaiso, Santiago and other important cities of Chile. Few business men will fail to observe the vast saving in time and distance over the old system of transportation via the stormy Cape Horn or the nearly as lengthy trip by the Straits of Magellan to Chile, Peru, Bolivia and other South American countries.

The Republic of Panama now proposes to build a line from Panama to David, thus making an important connection for the Pan-American Railroad project. The line will be about 300 miles long and of 5 ft. gauge. This line once in operation, there will only be the gap through Nicaragua to the Guatemala frontier where the Chiapas and Mexican railroads would bring direct communication with the United States by rail. South of the Isthmus of Panama, the longest gap to be completed would be through Columbia and Ecuador to the Peruvian lines of Lima and Callao, and through them, with small intervals, to Valparaiso, Chile. Then in three months the Transandine Railroad will complete the chain to Buenos Aires, Argentina.

Argentina's exports for last year were \$286,000,000 and her imports over \$275,000,000; all but some \$30,000,000, which were American goods, being from Europe. But who can wonder at this when Germany, England and France (and even Italy) have their own business houses, bankers and even steamer lines at Buenos Aires, Rosario de Santa Fé, Gualeguay, Corrientes, Cordova, San Juan and many other of the corn and cattle regions of the interior have German and British firms doing the importing and exporting business for all the surrounding country. More than double the amount of corn was shipped to Europe from Argentina last year than from the United States. Our business with Argentina is surely increasing, but it is yet very far from what could and should be done between two such important sections, both on the Western Hemisphere.

Chile intends to order nearly \$3,000,000 worth of guns and ammunition from abroad; why could not some of this be supplied by our manufacturers?

All the talk about a rival canal to the Panama, backed by Japan and Germany, is sure to turn into smoke. There is no doubt that the Attrato route for a canal through Columbia has quite a number of good points, but the Panama route is too far advanced to fear any rivals now. There are those who claim that five or six years will see it completed for traffic.

The revolution in Nicaragua has not helped business in the Central American regions; some fear invasion, others counter revolutions and dictators, so that one way and another business is suffering at present.

Columbia, through its government, is trying to attract capital for a line following the Magdalena and branching toward the Pacific. This is mostly mahogany and other fine timber land, with a number of cities and towns on the route, which also taps the gold and copper mines of the Andes. The Pacific region is mostly adapted to cocoa and coffee planting. C.

### Cast Iron Pipe Prices from 1900 to 1909.

The accompanying diagram, furnished by Daniel Runkle of the Warren Foundry & Machine Company, 111 Broadway, New York, shows the course of prices for the past 10 years on 6-in. cast iron water pipe, 30 lb. per foot, f.o.b. New York City, in carload lots, per ton of 2000 lb. For those who desire the tabulation of prices on which this diagram is constructed, the following average monthly prices are presented:

	1900.	1901.	1902.	1903.	1904.
January	\$27.50	\$21.75	\$24.50	\$29.25	\$24.50
February	26.75	22.25	25.00	29.25	24.25
March	26.75	21.50	26.25	30.75	24.25
April	26.50	22.00	26.00	31.00	24.25
May	26.00	22.25	27.75	30.75	24.00
June	24.50	23.00	28.00	30.75	23.50
July	24.75	23.75	28.50	30.75	23.50
August	23.50	23.75	29.50	29.50	23.50
September	22.25	23.50	29.50	29.00	23.00
October	21.75	24.00	29.50	26.00	23.25
November	21.75	24.50	30.75	24.50	25.00
December	21.75	23.75	29.25	24.25	27.00
	1905.	1906.	1907.	1908.	1909.
January	\$28.00	\$29.75	\$34.25	\$27.00	\$24.50
February	28.50	29.50	34.25	26.75	24.25
March	26.75	30.50	34.00	26.25	25.25
April	27.00	29.75	33.50	26.25	25.00
May	27.25	31.00	34.25	26.25	25.25
June	27.25	32.50	33.50	25.75	26.00
July	27.25	30.25	34.00	25.75	26.25
August	27.25	30.50	32.50	25.25	26.00
September	27.25	31.00	33.00	25.75	25.75
October	28.25	33.00	33.50	25.75	25.50
November	29.00	33.25	28.50	25.00	27.00
December	29.25	35.50	28.00	25.50	27.25

We take special pleasure in presenting this information, as the subject is one which has heretofore received scant attention from those engaged in making price comparisons. We have received numerous inquiries for cast iron pipe prices running over a series of years, but so far as could be ascertained no compilation of such prices had been made. The diagram and tables are well worthy of preservation.

The Henry A. Hitner's Sons Company, old material, with main office at Huntingdon street and Aramingo avenue, Philadelphia, Pa., announces that its New York office, at 90 West street, has been discontinued, and that the company's representative, William B. Ilko, will hereafter be located at the main office. The branch office in the Pennsylvania Building, Philadelphia, is also discontinued, and hereafter all business will be transacted through the main office.

The new dock, No. 2, of the Buffalo Dry Dock Company's plant, Buffalo River and Ganson street, Buffalo, N. Y., was completed and placed in service this week. It is one of the largest on the lakes, being 650 ft. in length.

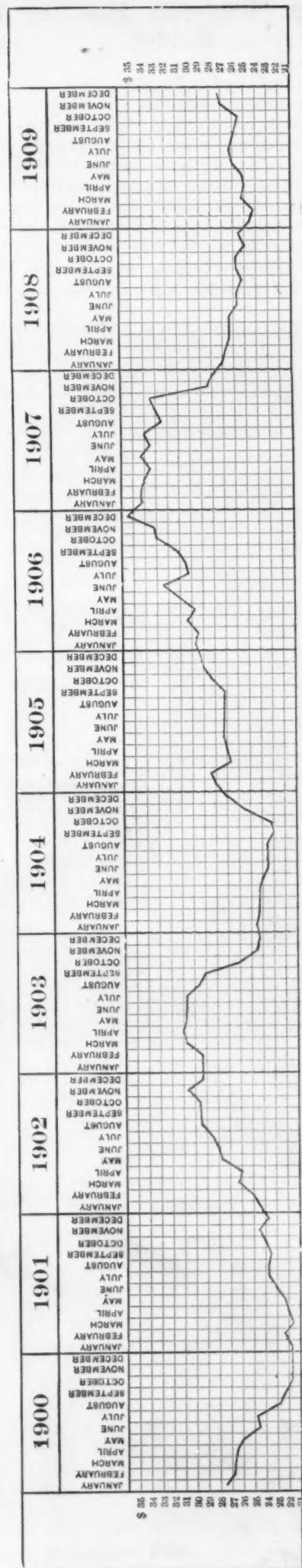


Diagram Showing the Course of Prices of Cast Iron Water Pipe for the Past Ten Years. The Diagram Is Based on the Price of 6 In. Pipe, Weighing 30 Lb. to the Foot, f.o.b. New York City, in Carload Lots, Per Net Ton of 2000 Lb.

## The Cox Universal Pipe and Tube Bender.

Bending pipe and tubing cold without using an inner filling is a problem that J. Fillmore Cox of J. Fillmore Cox & Co., Bayonne, N. J., has been at work upon for a number of years, and the machine illustrated in Fig. 1 is the result of his efforts. The line of machines as now built includes those for handling light work, such as bending  $\frac{1}{8}$ -in. tubing up to those designed for making bends in the largest sizes of pipe manufactured. All are the same in principle, although the construction is varied to suit the class of work handled. The smallest is a portable machine operated

by hand and the largest is one in which hydraulic pressure is employed.

A side view of the No. 2 Universal machine fully equipped for doing any kind of power bending is illustrated in Fig. 2. In this machine the endless chain mechanism is elevated above the table, but if desired it can be changed so as to run half above and half below the table, and beneath the pipe or tube that is being operated upon. This enables the hand wheel of the friction clutch, shown directly to the right of the inner sprocket wheel, to be placed at the right front corner of the main bed-plate instead of in the center of the same end. In this way a much more convenient location is secured.

Three classes of work can be done by this machine;

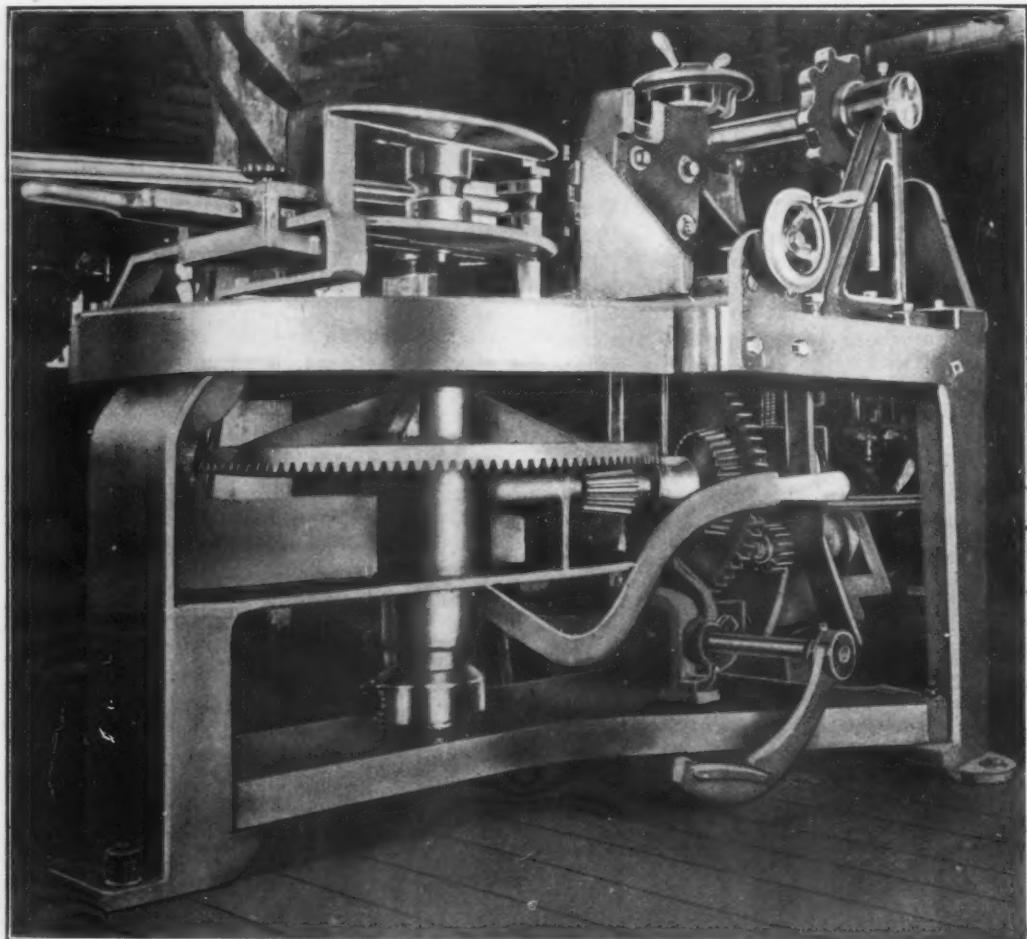


Fig. 1.—A Machine for Making Radial Bends Built by J. Fillmore Cox & Co., Bayonne, N. J., Shown Without the Rear Extension.

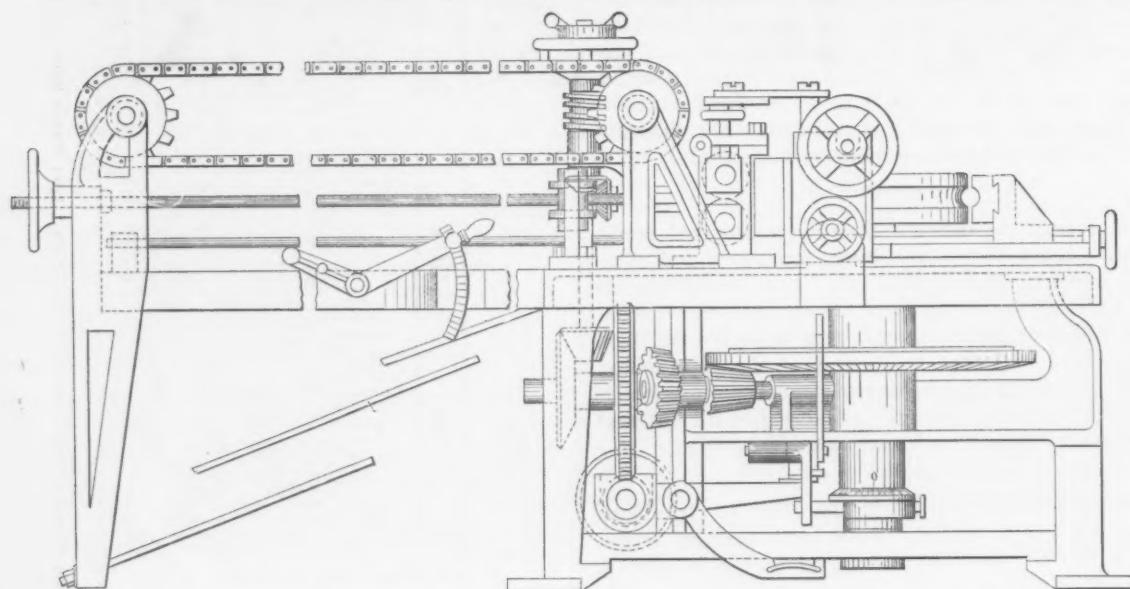


Fig. 2.—Elevation of the Complete Machine Shown in Part in Fig. 1.

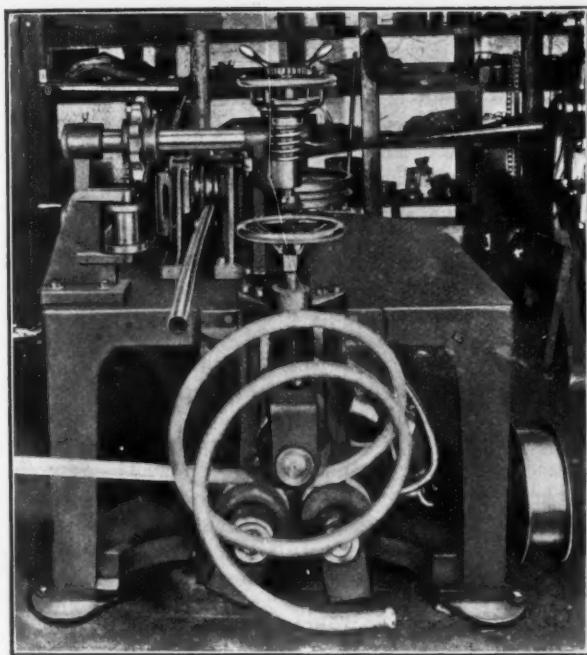


Fig. 3.—A Machine for Making Conical Helices and Also Radial Bends.

forming conical helices, constructing open spiral pipe coils, and making radial bends. These three distinct operations can be performed at the same time and Fig. 3 shows the first and last being accomplished simultaneously. The helix is formed by the three rollers shown at the end of the machine, which automatically curl the pipe and displace the convolutions so that none of them are in the same plane.

The method of making radial bends is clearly shown in Fig. 4, where a semicircular bend of  $5\frac{1}{2}$  ft. in  $1\frac{1}{4}$ -in. Shelby seamless steel tubing is being made. This bend is intended to form one-half of the rim of a life saving net such as is used by firemen to catch people jumping from burning buildings and is attached to the other segment by a hinged joint so that it can be folded up when not in use. The pipe or tubing passes first between two grooved wheels shown at the right of the machine directly under the shaft having a sprocket on the front end, and then between the large

wheel and a series of smaller grooved rollers that make it conform to the desired radius. For accurately duplicating bends of any radius and degree of curvature an automatic stop device is provided at the lower portion of the large shaft extending below the bed-plate in Fig. 2. When once set for any particular shape or size of bend, no further attention is required, as the machine will automatically reproduce the same kind of bend indefinitely.

To support long lengths of pipe for large bends or for making open spiral coils of pipe, a rear extension is employed. When used for forming spiral coils, a mandrel whose diameter is the same as the open space in the center of the coil is fitted in place underneath the table and driven through bevel gears from the big horizontal wheel located directly under the larger bending wheel shown in Fig. 4. As the mandrel revolves the pipe is wrapped around it by a grooved feeding pulley which travels along a rod similar to the lead screw of a lathe in a direction parallel to the axis of the mandrel. This extension is adjustable and can be made shorter or longer as the work requires.

Some of the work done by this machine is illustrated in Fig. 5, including a large variety of sizes and styles of bends. Among them are a right-angle bend in a piece of 4-in. steel tubing and an offset bend in the same kind of material, a number of different kinds of bends in 2-in. brass covered iron bedstead tubing and also in solid brass tubing of the same diameter. The large U-bend in the center of the illustration was made to show if it were possible to cut threads on both ends of a piece of 4-in. steel tubing previously cut to the required length, place it in the machine, make a U-bend without injuring the thread, and have the ends in such alignment that when the flanges were screwed on they would both be in the same plane. When finished and the flanges put in position, the accuracy of the bend was tested with a straight edge and the difference in level was only 0.004 in. In a subsequent test 800 lb. hydrostatic pressure was applied, and no flaws were revealed. Bends can be made also in lead, copper, white metal, and aluminum tubing of various diameters and thicknesses of wall and also in steel railroad rails, and steel angles, flats, and tees.

The machines show remarkable savings in the amount of labor and time required for making bends. The large bend of 4-in. steel tubing to a radius of 9

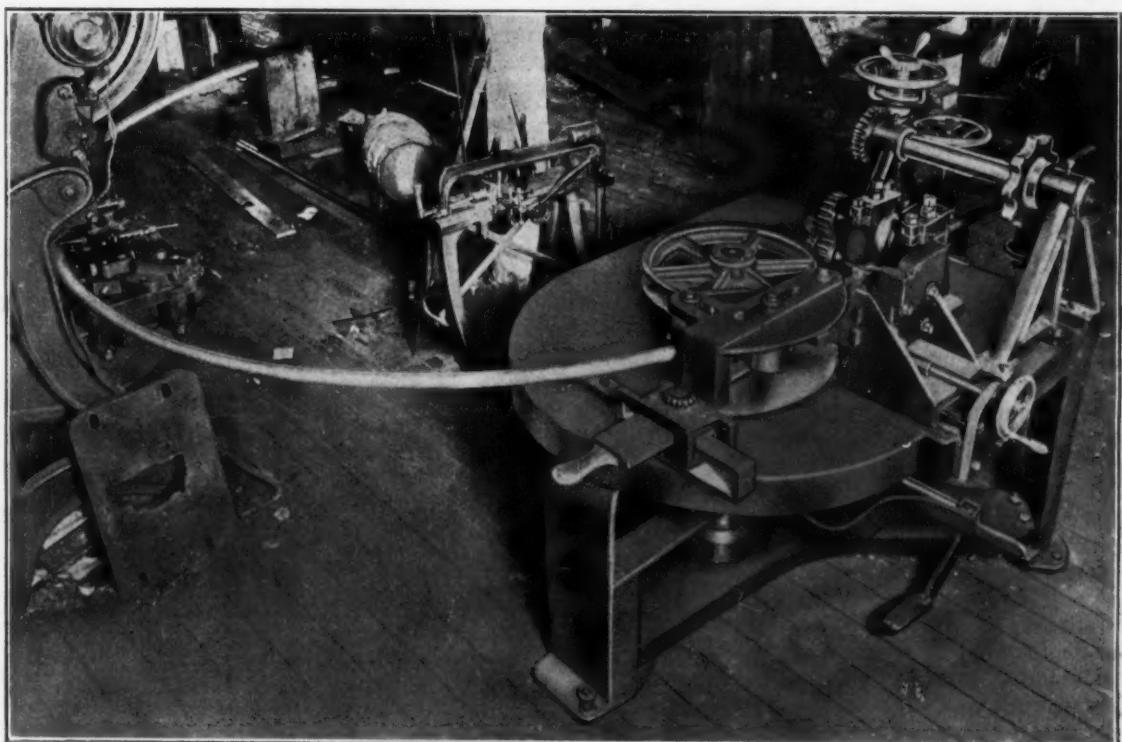


Fig. 4.—View Looking Down on a Machine Forming a Semicircular Bend of  $5\frac{1}{2}$  Ft. Radius.

in., previously mentioned, was made in  $1\frac{1}{2}$  min. after the pipe was placed in the machine and without any attention from the operator. Such a bend ordinarily would have required the undivided attention of three men for at least half a day, with the chance of not procuring one free from flaws or with unreduced internal diameter. This last is one of the chief defects in hand made offset and short radial bends where the area of the interior must not be diminished. A right-angle bend in 4-in. steel tubing was made in 1 min. and an offset bend of 4 in. in the same diameter of boiler tubing re-

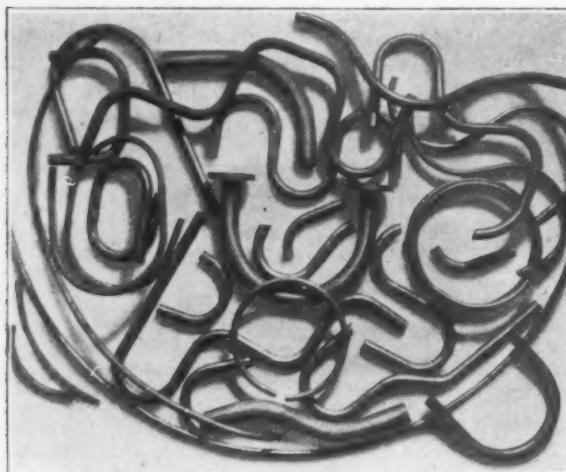


Fig. 5.—Examples of Pipe and Tube Bends Made on Cox Machines.

quired but 3 min. Another feature that saves labor in operating the machine is the possibility of making radial bends, helices, and open spiral coils simultaneously. A further economy results from the fact that the first of these is entirely automatic.

This saving is accomplished by using a magazine feeding arrangement which is employed when the endless chain runs forward above the table and returns beneath it. The magazine is located just above the chain and is a receptacle open at the top with sloping sides and a chamber at the bottom. The chamber is slightly wider than the diameter of the tubing used in making the bends and has a narrow slot in the bottom. The tubes are cut to the desired length and placed in the magazine and the machine started. An angle bracket attached to the upper side of the endless chain passes up through the opening in the bottom of the magazine and comes in contact with the end of the tube resting in the chamber, forces it through the opening in the end of the chamber which is in exact alignment with the bending wheels, and the bend is commenced. As soon as the bracket reaches the forward end of the chain, it passes down out of the slot and around the front sprocket wheel. The piece of tubing in the meantime is passing through the bending wheels and as soon as it clears the chamber in the bottom of the magazine another drops in its place. The sloping sides of the magazine eliminate chance of clogging.

One use for this machine is in steamship repairing and construction, where electricity is available for power to operate the machine. The machine can be moved to any part of the ship where bending is to be done. Thus the trips back and forth between the vessel and the shop on shore, where the work has been done heretofore, are avoided, and a considerable saving is effected in the time required to bend and fit the numerous railings and pipe lines. Other uses are for bending pipe and tubing used in the manufacture of metal bedsteads, automobiles, motor boats and gas and gasoline engines, and by street car builders for making bends in conduit piping, and engineers and contractors, plumbers and manufacturers of tubular wheelbarrow handles for metal barrows.

In addition, these machines are applicable for bending many other kinds of material.

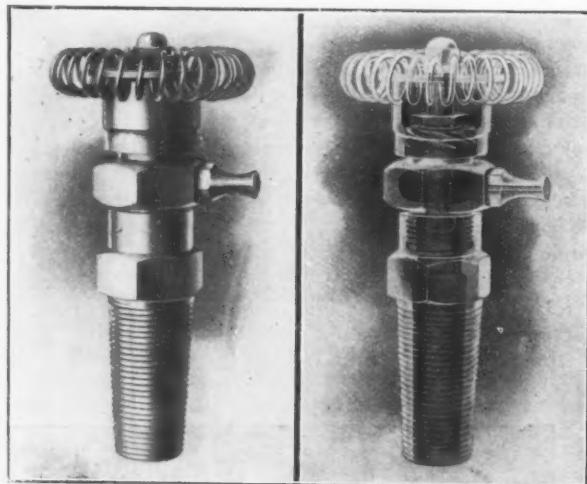
#### Gaco Automatic Locomotive Gauge Cocks.

It is common for locomotive engineers to neglect to use the compression gauge cocks because the more they are used the sooner they become leaky, and the subsequent incrustation must remain until the locomotive can be returned to the roundhouse. The Pittsburgh Gage & Supply Company, Pittsburgh, Pa., offers as a remedy the Gaco automatic locomotive gauge cock, which is claimed to be simple in operation, quick in action, self-closing, non-leaking and consequently free from incrustation.

The accompanying engraving shows exterior and sectional views of the cock. As will be seen, it is a departure from the old type compression gauge cock that opened with the pressure. The new style is a screw operated one that opens against the pressure, and the latter closes it automatically.

The advantages of self-closing gauge cocks are obvious. Time is of great importance, especially when running at high speed. At least 20 seconds is required to open and close a set of compression gauge cocks, while half that time or less suffices with automatic gauge cock. One quick turn opens the gauge cock, and it closes the instant the engineman removes his hand, seat, carrying off any sediment or dirt.

The closing of the Gaco cock by the boiler pressure is a unique feature. It is not only quick, but it keeps the seat clean and prolongs the life of the valve. Only enough pressure is applied to seat the valve properly and prevent leaks, and in no case will this



Exterior and Sectional Views of the Gaco Locomotive Gauge Cock  
Made by the Pittsburgh Gage & Supply Company, Pittsburgh, Pa.

exceed the pressure within the boiler. When the reverse is true and the pressure is utilized to open the valve, it is necessary to close the valve tighter each time it is used, and the seat soon becomes distorted and destroyed. Just before the valve in a Gaco cock seats a jet of steam or water flows across the face of the seat, carrying off any sediment or dirt.

Ease of making repairs and a self-grinding seat are two other advantages of this gauge cock. Boiler scale or grit under the valve seat is the cause of leaks, and this same foreign matter mixed with water forms an abrasive. Applying a wrench to the outer end of the valve stem and turning it until the valve is ground to a good fit on the seat will obviate the necessity for removing the cock for regrinding. To secure easy repairs and prevent wear on the boiler tappings the gauge cock is made in two parts—a threaded shank and a separate body. The shank is screwed into the boiler tapping and the body containing the valve, the seat and all the working parts is screwed into the shank. The latter is made interchangeable and each has a common seating position, so that when screwed into a shank the nozzle will be in the proper position.

## Piping in Steel Ingots.\*

### Influence of Top Lag on the Depth of the Pipe.

BY DR. HENRY M. HOWE, NEW YORK.

In my original paper, "Piping and Segregation in Steel Ingots," I pointed out among other things that, in view of the slighter stretching (virtual expansion) of the crust, and greater opportunity for sagging, there should be less piping in broad than in narrow ingots, and less in slowly cooled ingots—*e. g.*, those cast in pre-heated sand molds—than in those which cool quickly—*e. g.*, those cast in iron molds. A. A. Stevenson [Standard Steel Works Company, Burnham, Pa.] said that neither of these predictions agreed with his own experience. In particular, in a picture which he showed of a wide and of a narrow ingot cast from the same ladleful of steel, the wide ingot had certainly piped much more deeply than the narrow one. At the time I did not see the explanation of these discrepancies, but further reflection makes it evident.

One of the most important elements in determining the depth of the pipe is the degree of "top lag"—that is, the degree to which the solidification of the top of the ingot lags behind that of the bottom. Through this lagging the steel of the upper part of the ingot is able to run down and fill the pipe below as fast as it forms. To the importance of this lagging I called attention in my original paper.

#### Sand vs. Iron Molds.

If we compare two like ingots, one cast in an iron and the other in a sand mold, we see that the top lag is much greater in the former than in the latter, because in the former the lower part of the ingot is cooling off fast while the metal is running into the upper part. It is, perhaps, easier to look at this as a case of the solidification of the bottom outrunning that of the top, which is nothing but the other aspect of top lag. This stronger top lag in case of iron than in case of sand molds may well outweigh the influence of greater opportunity for sagging which the sand mold gives. It is to this effect that I refer the discrepancy between Mr. Stevenson's observation and my prediction. The latter ought to have been modified so as to take into account the greater top lag in the iron mold. If this influence can be cut out, then the effect of greater opportunity for sagging in the sand mold should become evident in the shortening of the pipe. In experiments which I have since tried I have found this to be the case.

A striking example of the shortening effect of slow cooling, which, as I asserted, ought to shorten the pipe, is given in the case of ingots which solidify slowly in the soaking pit. Their pipe is much shorter than that of ingots which solidify rapidly in the outer air.

#### Wide vs. Narrow Ingots.

The case which Mr. Stevenson gives, in which a narrow ingot piped much less deeply than a wide one cast from the same ladleful of steel, is seen, on further consideration, not to be a fair contradiction of my prediction, for two reasons. In the first place, the fact that these two ingots were cast with the wide end up tends to shorten the pipe much more in the narrow than in the wide ingot. I have insisted on the effect which having the large end up has of shortening the pipe by means of top lag, though I had not at that time devised this term. It is clear that the effect of this taper is much greater in a narrow than in a wide ingot. The taper is usually the same, and hence the absolute widening of the top is the same, in narrow as in wide ingots, and hence it forms a much larger proportion of the width of the ingot in narrow than in wide ingots. But the mere fact that the widening at the top bears

a greater proportion to the average width of the ingot in narrow than in wide ingots has for its clear result that this widening causes more top lag in narrow than in wide ingots. The effect of width as such on the depth of the pipe can be shown only when the effect of other variables is cut out. Now in this case the greater top lag caused by the taper in the narrow than in the wide ingot directly opposed the effect of width as such in permitting sagging and in lessening crust stretch. In order to test the effect of width as such parallel sided ingots should be used and the effect of other variables should be excluded. This I have done in certain preliminary experiments, which, as far as they go, support my prediction that width tends to shorten the pipe.

In case the ingots are tapered in the opposite direction, with the large end down, this taper, because it tends to lengthen the pipe, and because the effect of taper should be inversely proportional to the width of the ingot, should tend to lengthen the pipe more in narrow than in wide ingots. In fact, this influence is relatively unimportant in wide ingots.

The second reason why the evidence given by Mr. Stevenson's wide and narrow ingots is not valid is that the narrow ingot was poured much more slowly than the wide one, and this in itself, as I pointed out clearly, has an important effect in shortening the pipe. It was evidently poured much more slowly than the wide ingot, because the two were in the same bottom cast group, and consequently the steel must have entered the narrow ingot very much more slowly than the wide one.

Everything else being equal, the more rapid cooling of the bottom of a narrow than of a wide ingot tends to give the former greater top lag than the latter, and thus to shorten its pipe.

Looking at it in a general way, we see that narrowness in one way tends to shorten the pipe and in other ways tends to lengthen it. On one hand, in that it leads to (1) the more rapid cooling of the bottom, it increases top lag and thereby tends to shorten the pipe. On the other hand, narrowness tends to lengthen the pipe (2) by leading to relatively great crust stretching (virtual expansion), (3) by giving little opportunity for sagging, and (4) (for given rate of pouring) by leading to rapid rise of the surface of the metal, and in this way lessening the top lag. My original prediction, supported by the observations which I had then made, was based on these latter considerations, (2), (3), and (4), and overlooked consideration (1). Now it may be shown hereafter that my prediction does not hold true under certain comparable conditions, or even under most comparable conditions. But Mr. Stevenson's evidence does not prove this, because if my prediction is true that the net effect of narrowness as such is to lengthen the pipe, nevertheless this effect might be completely masked under his conditions by the joint effect of (1) his having the large end up and (2) his pouring more rapidly into the wide than into the narrow ingot, because both of these things should tend to give the narrow ingot the shorter pipe of the two.

In other words, his conditions introduced certain accidental concomitants of narrowness, which concomitants clearly tend to shorten the pipe in his narrow ingots, and thus to mask the influence of narrowness as such. The fact that in the presence of these pipe-shortening concomitants the predicted pipe-lengthening effect of narrowness as such is not seen, is no proof either that that effect does not exist or that it would not be seen when such masking concomitants are absent.

William B. Harvey, receiver of the Solid Steel Casting Company, Chester, Pa., will resell the property January 11. The sale made several months ago was not confirmed by the courts.

\* A paper prepared for the Spokane meeting, September, 1909, of the American Institute of Mining Engineers.

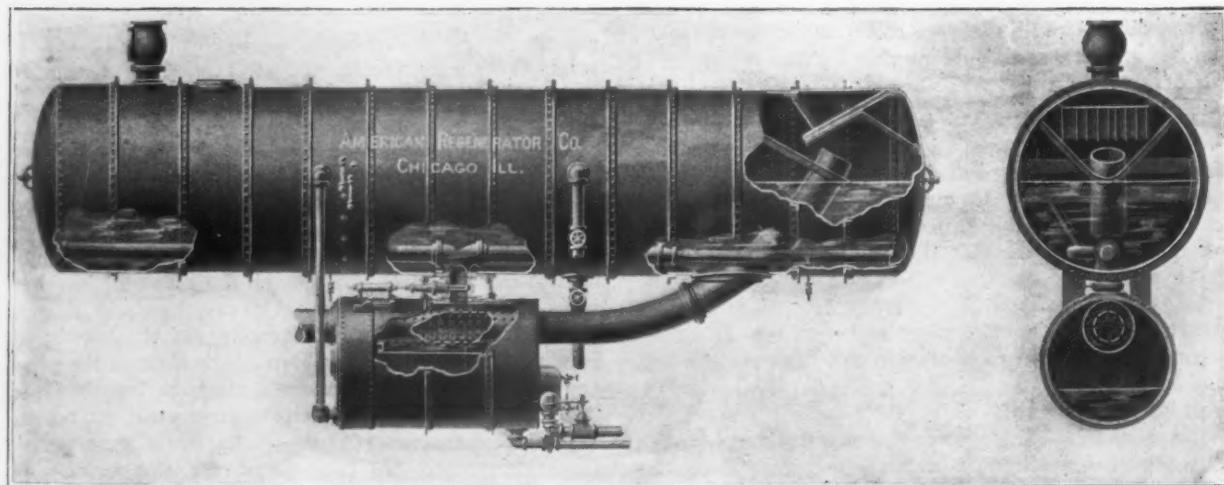
## The American Steam Regenerator.

Although, theoretically, more power should be obtained by exhausting a reciprocating engine into a 30-in. instead of a 26-in. vacuum, it is found in practice that the large increase in volume of steam necessitates such large engine cylinders that no gain in economy is experienced. In expanding steam adiabatically through a range of pressure, say, from 150 lb. gauge to 28-in. vacuum, almost half of the heat energy which can be converted into useful work is available below atmospheric pressure. Therefore when engines exhaust to atmosphere nearly half of the available energy in the steam is thrown away. Reciprocating engines show higher efficiencies working through the higher range of steam pressures, while steam turbines show higher efficiencies when working under low pressures, as from atmospheric pressure down to a 28-in. vacuum. Working through the range of pressure above atmosphere, a compound reciprocating engine will convert about 65 per cent. of the available energy into useful work, and a triple or quadruple expansion engine realizes only about 40 per cent. efficiency in the range below atmosphere; but a low pressure steam turbine easily shows an efficiency of 80 per cent. in work-

rises, whereupon some of the steam gives up its heat to the water in the receiver, causing condensation. When the steam withdrawn by the turbine is greater than the supply given by the engine, the pressure in the receiver falls, and the water gives up some of its heat, thereby re-evaporating a certain amount and supplying the deficiency of steam. The amount of heat storage, therefore, is limited by the range of rise and fall in temperature of the heat storing medium. If it is desired to maintain the pressure in the receiver within the limits of 15 and 18 lb. absolute, the temperature range will be from 213 to 222.4 degrees F., and each pound of water heated and cooled throughout this range will store up and release 9.4 B.t.u.

What is considered an improvement over these attempts to use iron trays is an apparatus recently placed on the market by the American Regenerator Company, Chicago, Ill. It is so designed that each particle of steam entering comes into intimate contact with many times its own weight of the coldest water, and because of first encountering the coldest water and because the hottest water is on the surface, the circulation is perfect, and all the contained water is effective.

Referring to the illustration herewith, the water from the larger tank falls through a pipe containing a



Side and Sectional Elevations of the Steam Regenerator Built by the American Regenerator Company, Chicago, Ill.

ing from atmospheric pressure down to a 28-in. vacuum.

The steam turbine is adapted to handling large volumes of steam at slow velocity and the reciprocating engine small volumes at high velocity; hence a combination of the two seems ideal. Steam plants now using reciprocating engines, either condensing or non-condensing, generally can add an exhaust steam turbine to the present equipment and increase the power output from 60 to 100 per cent. without further investment in boilers, chimneys or housings, and since no more live steam is used, the coal consumption will not be increased. The chief difficulty is that the exhaust from the reciprocating engine is intermittent, while the steam turbine should have a constant pressure at this first stage. Another is that the load on the turbine cannot be kept exactly equal to the load on the engine. It is necessary to have some sort of steam storage to absorb the excess exhaust steam of one moment and carry it over to make up the deficiency of the next.

Such storage has been sought by passing the engine exhaust into large receivers or tanks filled with iron or with water in iron trays, but because of the low heat absorbing capacity of iron (one-ninth that of water), such receivers have necessarily been tremendously large, heavy and costly for the amount of heat stored. When more steam is delivered to the receiver by the engine than is withdrawn by the turbine, the vapor pressure and, therefore, the vapor temperature

valve into an annular space surrounding the perforated spray pipe, through which the exhaust steam from the engine enters at the left. In entering the lower chamber the exhaust steam operates a vane, which in turn controls a valve in the pipe connecting the upper and lower chambers; thus the amount of water supplied to the outside of the spray pipe is always proportional to the amount of exhaust steam passing through it. In this manner the steam comes into thorough contact with every particle of the water, so that the water is heated up to the full temperature of the exhaust steam. The momentum of the steam is sufficient to carry the mixture of water and steam up through the eduction pipe into the upper tank, where the mixture is delivered against suitable baffles and separated from the steam.

The water level being at the center of the tank gives a shallow depth of water, enabling steam to be readily disengaged during re-evaporation and presenting the maximum surface for the disengagement. The hydraulic head of a body of water influences the speed of evaporation. The increase in temperature required for the liberation of steam is 1 degree F. for each 8 in. depth of water. Given sufficient time, the warmer water would, of course, come to the surface by gravity circulation and liberate its steam, but in the apparatus of this kind time is a principal element. A further advantage of carrying the level at the center line of the tank is that it gives a greater liberating area, which means less tendency toward priming and carrying over

of water with the steam to the turbine. It is important that the steam supplied to the low pressure turbine be as dry as possible, not only for economy, but also to prevent erosion of the turbine blades.

To supply 1 lb. of steam at 15 lb. absolute pressure requires 965.6 heat units, and if the total range in pressure is from 15 to 18 lb. and from 213 to 222.4 degrees in temperature, each pound of water will restore 9.4 B.t.u., and therefore to supply 965.6 B.t.u. to evaporate 1 lb. of steam, the tank should hold 103 lb. of water for each pound of steam to be supplied to the turbine during the period of regeneration. The pressure at which the regenerator is operated can be varied to suit requirements, but it will usually be found advisable to operate at or above atmospheric pressure to forestall air leaks, as air is highly detrimental to the vacuum in the condenser. Obviously the size of the regenerator will be determined not only by the amount of exhaust steam supplied by the engine and by the size of the turbine, but also by the length of the time interval during which the regenerator must supply steam to the turbine.

In some cases the regenerator will have to furnish all the steam during certain periods of time, as in the case of reversing rolling mill engines, mine hoisting engines, steam hammers, &c., which stop altogether. In a large number of plants, however, the supply of steam does not cease entirely, but only fluctuates—that is, there are peaks and valleys in the load curve. Supposing that the turbine load is constant and that all the exhaust steam is to be utilized; these peaks must be carried over to fill up the valleys, and the size of the regenerator will be determined by the magnitude and duration of the load fluctuations. It is not desirable to provide storage for too long a period, since if the main engines are stopped for any considerable time the boilers will soon begin to blow off, and it will be as well to use this blow-off steam directly in the turbine through a reducing valve, or on the high pressure stage of a mixed flow turbine, as to provide sufficient regenerator capacity to carry the turbine over a longer period of time.

The use of a regenerator is to smooth out the variations between the momentary discharges of the reciprocating engine and the demands of the steam turbine. The regenerator is to the steam turbine reciprocating engine combination what the storage battery is to the electrical circuit or the flywheel is to the reciprocating engine.

#### A Clough Motor-Driven Vertical Miller.

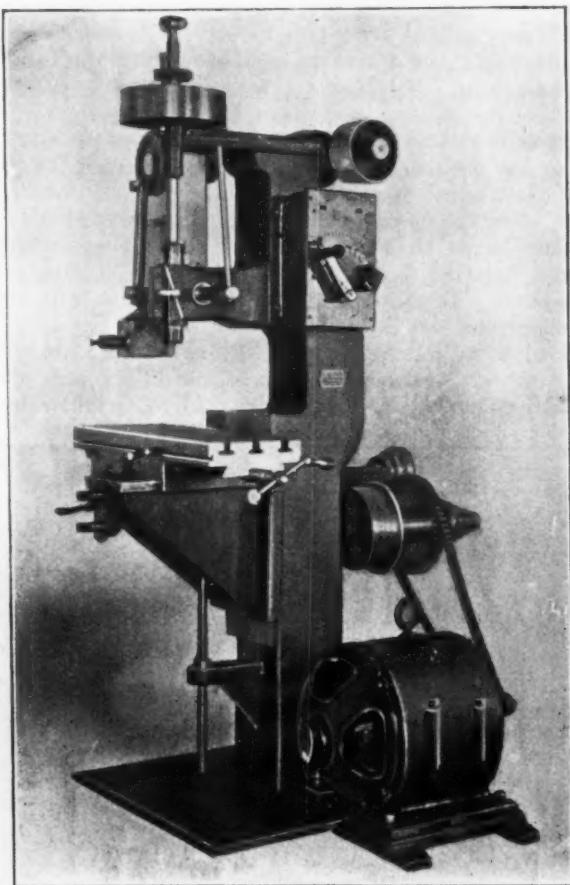
The No. 2 vertical milling machine, with slotting attachment, built by R. M. Clough, Tolland, Conn., is shown in the accompanying illustration, equipped with motor drive. The power is furnished by a 1½-hp. variable speed 120-volt motor manufactured by the Ridgway Dynamo & Engine Company, Ridgway, Pa., connected to the rear shaft of the miller by a Morse silent chain. The starting box and speed variator are mounted on the side of the machine in a convenient location.

The table of the machine is 28 in. long, 9¾ in. wide and has three 5/8-in. tee slots extending the length of the table, and a pan at the right end. There is an automatic feed of 21 in. and a cross motion of 9 in., while the table may be raised or lowered through a range of 15 in. The screws for the cross and vertical motions are provided with dials graduated in 1-1000 in.

The spindle has speeds ranging from 100 to 500 rev. per min. It is 1 7/8 in. in diameter at the lower end, where it is provided with a taper bearing 7 in. long and 1 5/16 in. in diameter at the opposite end. Check nuts are furnished at each end for adjustment. The spindle has a No. 10 B. & S. taper hole, and is provided with a draw in rod for arbors. The spindle

sleeve is operated by a rack and pinion throughout the 5-in. range of its motion, and may be clamped for milling by the lever at the right side of the head.

The slotting attachment is bolted to the side of the head, and also to the top of the machine. The slide is 12 in. long and has a 10-in. bearing. The drive is by a hardened tool steel worm 2 1/8 in. in diameter that meshes with a bronze worm wheel having 72 teeth.



The No. 2 Vertical Milling Machine with Slotting Attachment, Built by R. M. Clough, Tolland, Conn., Equipped with Motor Drive.

The gearing ratio is such that the spindle makes 12 revolutions to each stroke of the slide. The length of stroke of the slide is 4 3/8 in. and it can be adjusted to slot either transversely or longitudinally of the table, and to any angle not exceeding 7 degrees on either side of the vertical. The worm drive of the slotting device can be thrown in or out of engagement by the lever at the top of the attachment almost instantly.

The United States Circuit Court, Trenton, N. J., on January 3 affirmed the sale of the Passaic Steel Company, Paterson, N. J., to Theodore H. Conderman, as chairman of the bondholders' committee, for \$400,000. The conditions of the sale imposed by the court include the payment in cash of \$100,000, and a bond of \$50,000 to be given the purchasers to guarantee certain of the claims. The order authorizes the acceptance of bonds at the approximate price of \$120 each as the part of the purchase price.

The Northern Equipment Company, Chicago, which recently absorbed the American Boiler Economy Company, states that on account of the rapidly increasing sales of the Copes boiler feed regulator and the Copes pump governor it has been forced to secure larger manufacturing space. The office in the Old Colony Building has been given up and the office force transferred to the new factory building, which is located at 408-418 West Indiana avenue, Chicago.

### New Waterbury Farrel Thread Rollers.

The reciprocating screw thread rolling machines illustrated constitute a new line for their builder, the Waterbury Farrel Foundry & Machine Company, Waterbury, Conn. While following in a general way the design of their predecessors, they have been simplified and changed in essential details and contain several departures from the company's previous models. The Whitworth quick return mechanism has been dispensed with and in its place has been substituted the offset crank shaft. The center of the crank disk is set well below the line of the work, so that a maximum of power is obtained on the working motion of the crank, together with a faster movement on the return of the slide. The use of one stationary and one reciprocating die is retained, but in the new type the moving die is made longer than the stationary one. The machine may, however, be adapted to receive dies of the old standard. Important changes have been made in the hopper feed and its drive, a toothed wheel being provided to insure the correct delivery of the blanks to the chute. The new machine is built in six sizes, the smallest having a rated capacity of  $\frac{1}{4}$  in. diameter,

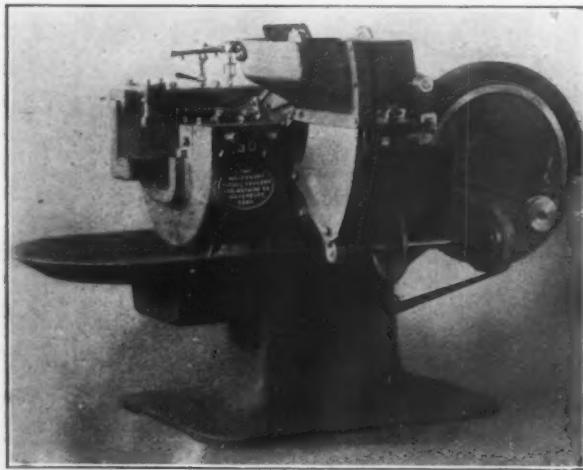


Fig. 1.—The No. 30 Thread Roller with Hopper Feed, Built by the Waterbury Farrel Foundry & Machine Company, Waterbury, Conn.

the largest of 1 in. The details of these and the intermediate sizes will be found in the specifications at the end of the article.

Fig. 1 shows the No. 30 machine, one of the smallest sizes; Fig. 2 the No. 60, the largest size; Fig. 3 the machine equipped with the hopper feed, with the details of its drive, and Fig. 4 a special machine tilted at an angle to procure the automatic feed of headless blanks.

Screw thread rolling machines are coming into more common use in the manufacture of many articles

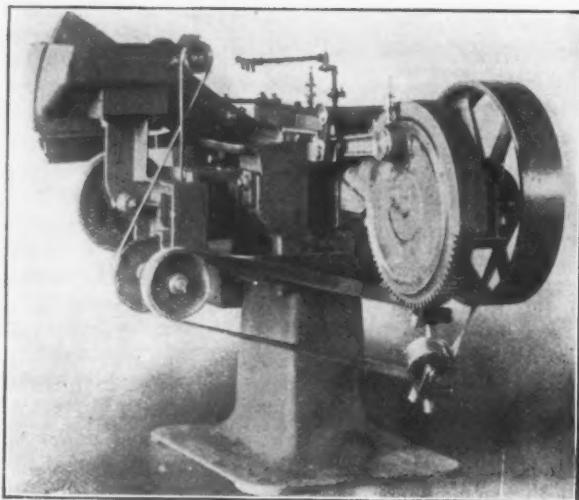


Fig. 3.—Another View of a Hopper Feed Thread Roller, Showing the Drive of the Hopper.

because of the greater rapidity of production as compared to cutting the threads with ordinary threading dies. In the thread-rolling process the stock on the blank is displaced during the rolling operation to form the threads, but none of it is removed. The finished thread has a larger outside diameter than the blank upon which it is rolled.

In the new machine the dies are of liberal length. The slides and die blocks are cut out to receive a maximum depth of dies, which allows of threading longer work on the company's standard machine than has heretofore been practical. All the screws used in making the adjustments of the dies are on top and therefore accessible. The slides are well gibbed to allow for taking up wear. A spring knockoff insures the ejection of the work from the dies as soon as it is threaded. Special care has been given to guarding the gearing and connections, and it will be noticed that those parts immediately near the operator are thoroughly protected. The standard machines are built with oil pan and have a lubricating system, the use of which is recommended whenever possible.

In the hand feed machine the blanks are placed in front of the pusher or starter plate, against an adjustable depth gauge for determining the length of thread to be rolled, which is thus kept constant. This depth may be anything from zero up to the capacity of the machine. The gauge can be adjusted by a screw while the machine is in motion. The pusher delivers the blank to the dies. It is operated by a spring during its forward motion and returns by a cam which is so timed as to insure feeding at the proper moment. If through any failure of the knockoff to remove a blank from the dies it should return, no damage can be done to the pusher. In adjusting the dies the position of the stationary die alone is changed. The pusher slide is

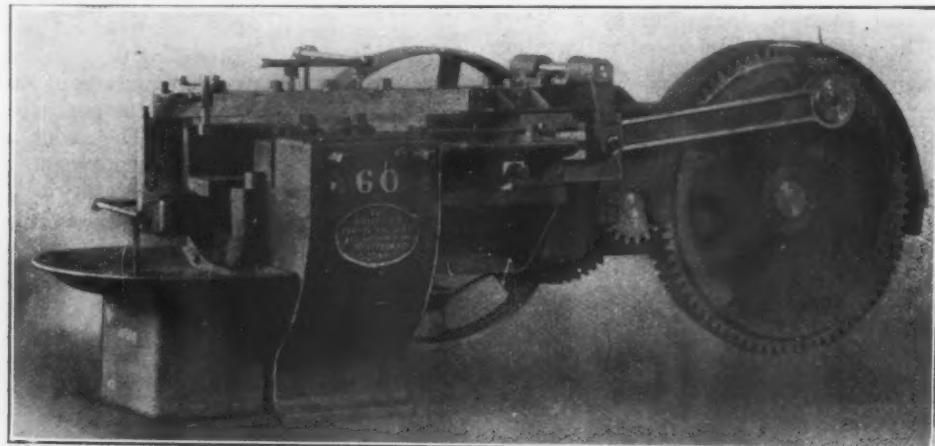


Fig. 2.—A Heavy Waterbury Farrel Thread Roller with Hand Feed.

in the casting, at the top of which is the hand feed pan, and the whole is adjustable at right angles to the die by a screw, to give the correct position of the pusher for different sizes of work.

Referring to Fig. 3, a rapidly revolving wheel, known as the clearer, consisting of two ratchet tooth disks, separated by a smaller disk, also toothed, is mounted in the hopper at the entrance of the chute, and is adjustable so that its teeth will strike any blank about to enter the chute which is not in the required position, knocking it back into the hopper. Above the agitator is a guard which serves to keep the wheel from clogging. The shaft of the agitator is adjustable toward and away from the chute to conform with the height of various shapes of heads. It is belted to a pulley on the hopper driving shaft. The hopper, its support and its drive are mounted as one unit, which is adjustable vertically to give the required position for the

the dies. This is accomplished by an adjustable guide which forms a part of the cover over the chute. The cover is arranged to swing up to permit of the removal of blanks. The chute consists of two parallel plates adjustable away from and toward one another for different diameters of work. The slotted portion of the hopper blade is removable to accommodate different diameters.

Beneath the position where the work enters the dies is an opening in the bed extending through to the pan, which allows scale and other foreign substances to be washed away by the lubricant. The casting pitches sharply at each side of the opening, which also assists in keeping the machine free from anything that might cause injury should it get into the working parts.

The specifications of the six sizes of threaders follow:

	Size.
Rated capacity diameter, inches.....	
Number of strokes per minute, about.....	
Standard depth of dies, inches.....	
Maximum depth of dies, inches.....	
Length of moving die, inches.....	
Length of stationary die, inches.....	
Thickness of dies, inches.....	
Diameter and face of pulley, inches.....	
Speed of pulley, revolutions per minute.....	
Ratio of gearing.....	
Floor space of plain machine, inches.....	
Weight of machine with hand feed, pounds.....	

10	20	30	40	50	60
$\frac{1}{4}$	$\frac{3}{8}$	$\frac{3}{4}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{1}{2}$
70	60	50	40	35	30
1	$1\frac{3}{4}$	2	$2\frac{1}{4}$	$2\frac{1}{4}$	3
$1\frac{1}{4}$	2	$2\frac{1}{4}$	$3\frac{1}{4}$	$3\frac{1}{4}$	$4\frac{1}{4}$
5	$6\frac{1}{4}$	$8\frac{1}{2}$	10	12	16
$4\frac{1}{4}$	8	$7\frac{1}{2}$	9	11	15
$12\frac{1}{16}$	$1\frac{3}{16}$	$1\frac{7}{16}$	$1\frac{11}{16}$	$1\frac{15}{16}$	$2\frac{1}{16}$
20 x $3\frac{1}{4}$	25 x $5\frac{1}{4}$	30 x $5\frac{1}{4}$	35 $\frac{1}{4}$ x $6\frac{1}{4}$	48 x $6\frac{1}{4}$	46 x $7\frac{1}{4}$
280	270	250	250	260	300
1 to 4	1 to $4\frac{1}{2}$	1 to 5	1 to $5\frac{1}{2}$	1 to $6\frac{1}{2}$	1 to $10\frac{1}{2}$
48 x 26	55 x 32	82 x 40	95 x 54	122 x 60	144 x 67
1,025	1,875	3,090	5,200	8,660	14,400

length of thread to be rolled. The belt tension remains constant. The drive is transmitted to the hopper driving shaft from a pulley fastened to the crank disk shaft on the opposite side of the machine, by a belt

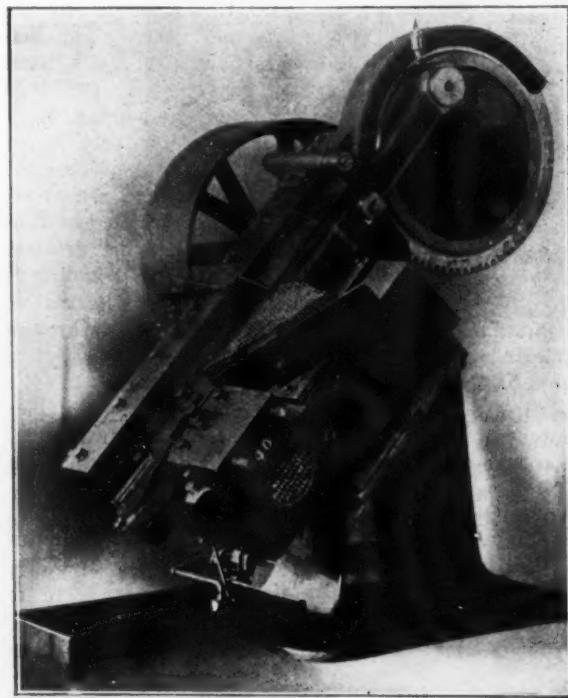


Fig. 4.—An Inclined Thread Roller for Automatically Feeding Headless Blanks.

passing over idler pulleys, which give a quarter turn of ingenious construction.

In using the hopper feed the blanks are picked up by the blade and delivered to the chute, down which they pass hanging by their heads. At the exit of the chute is arranged a cutoff knife which takes the blank and delivers it in front of the pusher. This knife also acts as an escapement, permitting only one blank to be fed at a revolution. It will be seen that while with the hand feed the blank is held at the bottom against the depth gauge with the automatic feed, it is held at the head while being pushed from the exit of the chute to

#### Wellman-Seaver-Morgan Company Installations

Additions and improvements to steel plants in the past year have kept manufacturers of equipment for those plants well filled with orders. The growth of the demand for gas producers has been particularly marked. In addition to smaller orders the Wellman-Seaver-Morgan Company, Cleveland, Ohio, has furnished installations of the Hughes gas producers in the year as follows: National Tube Company, American Steel & Wire Company, Tennessee Coal, Iron & Railroad Company, Pennsylvania Steel Company, Midvale Steel Company, Indiana Steel Company, Reading Iron Company, Inter-Ocean Steel Company, Ford Steel Wheel Company and Ford Motor Company. Orders from some of these companies were duplicated within the year.

In addition to orders for equipment for plants not directly connected with the iron and steel industry the Wellman-Seaver-Morgan Company has taken orders for or completed the following installations in the past few months: Low type open hearth charging machines for the Indiana Steel Company, three furnished and three others now being built; high and low type of charging machine for the Midvale Steel Company, special large charging machine for the Tennessee Coal, Iron & Railroad Company, a duplicate of two others furnished in the previous year and heaviest of the type ever built; high type charging machine for the Cambria Steel Company; five-ton ore bridge for the Upson Nut Company; four-ton ore bridge for the Lake Superior Iron Corporation; special low type charging machine for the United Steel Company; six traveling manipulators for handling wheel blanks for the Standard Steel Works, Burnham, Pa.; four 15-ton ore unloaders for the Lake Shore Railroad docks at Ashtabula Harbor; a steam operated stationary car dumper for the Pennsylvania Railroad.

The second annual banquet tendered the foreign and traveling representatives and heads of departments by E. W. Edwards, president of the Edwards Mfg. Company, "the sheet metal folks," Cincinnati, Ohio, occurred on the evening of December 30, at the Business Men's Club rooms, Chamber of Commerce Building. There were 32 highly pleased participants.

### A Large Bliss Single Acting Press.

What is probably the largest straight sided, single crank, single action press ever built is shown in the accompanying illustrations. This press was built by the

E. W. Bliss Company, 11 Adams street, Brooklyn, N. Y., for the Hydraulic Pressed Steel Company of Cleveland, Ohio, and weighs 164,000 lb.

The press, shown in Fig. 1, is of the Bliss built-up type, and is provided with four vertical steel tie rods of large diameter. These rods receive all the strain due to the pressure exerted in operating the press and thus relieve the frame columns. The cross sectional area of these columns is large and they impart great rigidity to the entire structure, while the heavy extending feet are so proportioned that ample stability is secured.

The dimensions of the bed are 48 x 60 in. The slide is illustrated in Fig. 2, and weighs over 7 tons. The separate illustration of the shaft (Fig. 3) will give some idea of its proportions. The steel gears are very compact, and have machine cut teeth throughout. Each of the main gears weighs over 6 tons.

It will be noticed by referring to Fig. 1 that power is applied at both ends of the crankshaft through the two main gears, located one on either side of the press. This greatly reduces the bending and torsional strains on the crankshaft and equalizes the pressure on the journals and gears. The machine is controlled by a hand lever operating a combined friction clutch and brake, especially designed for very heavy duty. The friction surfaces are heavy and rigid, and are so arranged as to be relieved of rubbing contact when not driving. An improved safety coupling is attached to the flywheel as a

safeguard in case the press is subjected, through carelessness or otherwise, to a pressure greatly in excess of that for which it is designed.

Large double crank presses and drawing presses are not unusual in present day processes of sheet metal working, but this press is a departure in forming extra heavy gauge sheet metal cold. Where such great pressure has been required heretofore, hydraulic presses have been used, but where a large number of articles are to be stamped, the hydraulic press is slow and it is also difficult to keep the die and punch in accurate alignment. In this press, however, the slide is in very long and substantial gibs, and once the tools

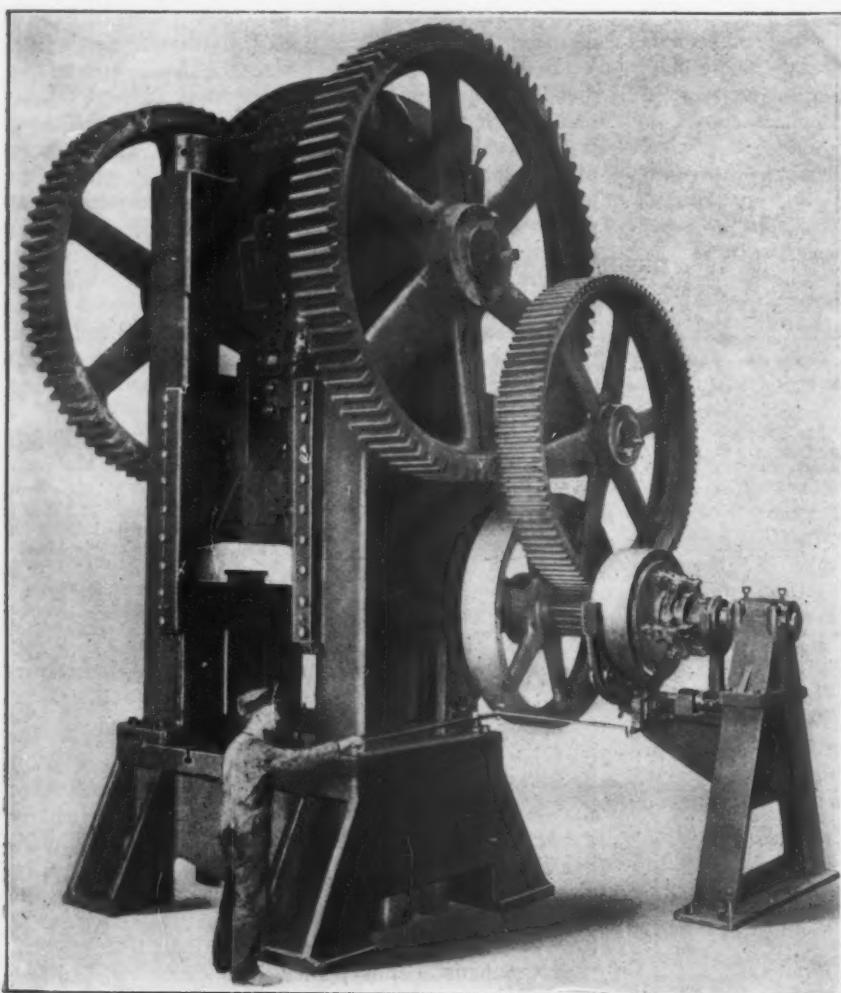


Fig. 1.—The No. 80½ Single Acting Press Built by the E. W. Bliss Company, Brooklyn, N. Y., for the Hydraulic Pressed Steel Company, Cleveland, Ohio.



Fig. 2.—The Slide of the Press, Which Weighs Over 7 Tons.

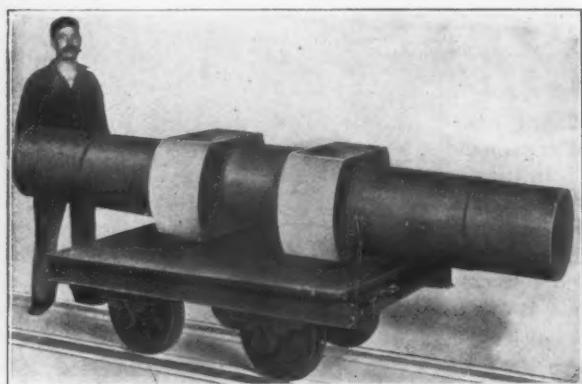


Fig. 3.—The 15-Ton Crankshaft of the Press.

are properly set, perfect alignment is always secured.

The great demand for heavy sheet metal stampings, such as brake drums and axle housings for automobiles, led to the construction of this machine and the tremendous pressure exerted by the press results in forming parts more economically and readily than by the methods formerly employed and the articles themselves are more accurately and uniformly made.

**The Baird Wire Forming and Stamping Machine.**

Owing to a great demand for a machine to manufacture small articles from wire, the Baird Machine Company, Oakville, Conn., has added a wire stamping

stamped. Specimen pieces made in this machine are illustrated in Fig. 2. The completed loops and buckles are turned out at the rate of approximately 60 to 80 per minute, according to size and shape, and no attention is necessary from the operator beyond keeping the machine supplied with wire and removing the finished product from time to time.

Two sizes of machine are built at the present time. The smaller one makes articles that do not require more than 6 in. of wire of less than 0.125 in. diameter, while the other is intended for articles consuming 9 in. or less of wire, whose diameter does not exceed 0.2 in.

The material and workmanship are such as to give satisfactory service, and all cam linings, rolls and pins

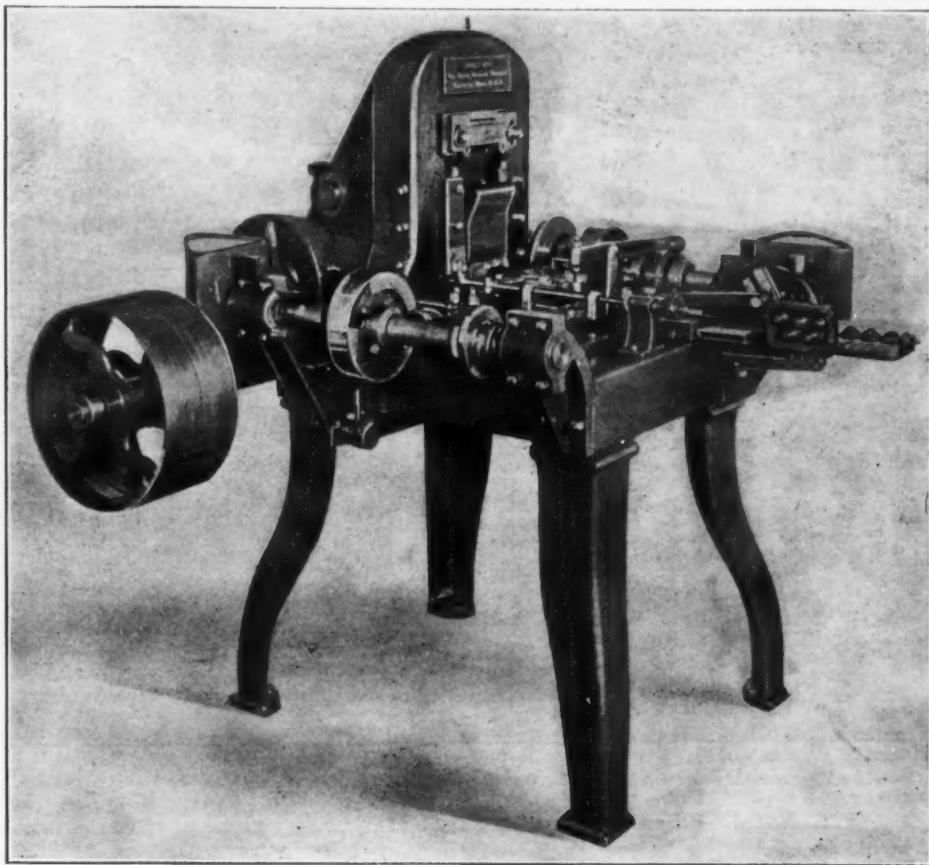


Fig. 1.—Wire Forming and Stamping Machine, Built by the Baird Machine Company, Oakville, Conn.

and forming machine, illustrated herewith, to its standard line of machines. Originally this was a special machine designed for manufacturers of hose supporters and suspenders, but the fact that other uses were found for it as well led to its being built as a standard line.

In operation, the machine (Fig. 1) automatically takes the wire from the coil, straightens, feeds, cuts off, forms and stamps it into small articles, such as hose supporter and garter loops, suspender and belt buckles and other articles that have to be formed and

are of tool steel and all surfaces in sliding contact are hand scraped to a bearing.

**Resistance Alloys.**

The Driver-Harris Wire Company, Harrison, N. J., is distributing a celluloid pocket with a cardboard slide inside, containing tabular data pertaining to resistance alloy wires of various kinds of electrical work. The column headings are printed on the celluloid over an aperture through which the numerals on the card slide inside are exposed. To obtain the data with respect to any given size of wire the card slide is moved until the required size is just under the table headings, when all of the other data may be easily read. The table on one side gives the number of the wire in Brown & Sharpe gauge, its diameter in inches, the weight per 1000 ft. bare and the current carrying capacity in amperes of Advance or copper, Nichrome or Climax and German silver wire, and on the other side the resistance with reference to the gauge sizes of Nichrome, Climax, Advance, German silver and copper wire. On the outside of the pocket is a view of the company's works and list of its products, standard resistance alloys in the form of ribbon, sheet and wire.

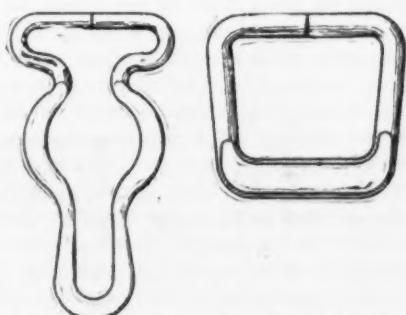


Fig. 2.—Specimens of Work Turned Out by the Baird Wire Forming and Stamping Machine.

## The Covington Coal Leveling Machine for Beehive Ovens.

What has proved to be one of the most remarkable inventions for assisting in the economical production of coke since the birth of that important industry is a new and unique machine for leveling coal in beehive ovens. This machine is now being placed on the market by the Covington Machine Company, Covington, Va., that a few years ago introduced the coke draw-

coke the coal which has heretofore been carried to the ash dump because the charge did not burn off by reason of improper hand leveling. Another reason why more coal is burned than in hand leveled ovens is that as soon as an oven is drawn the door is immediately bricked up and daubed before the oven is recharged. In this way so much heat is conserved that the new charge will ignite in about one-third the time required where hand leveling is employed. As a result the coal has longer to burn, which helps to increase the yield.

The machine, as shown in Fig. 1, consists of a

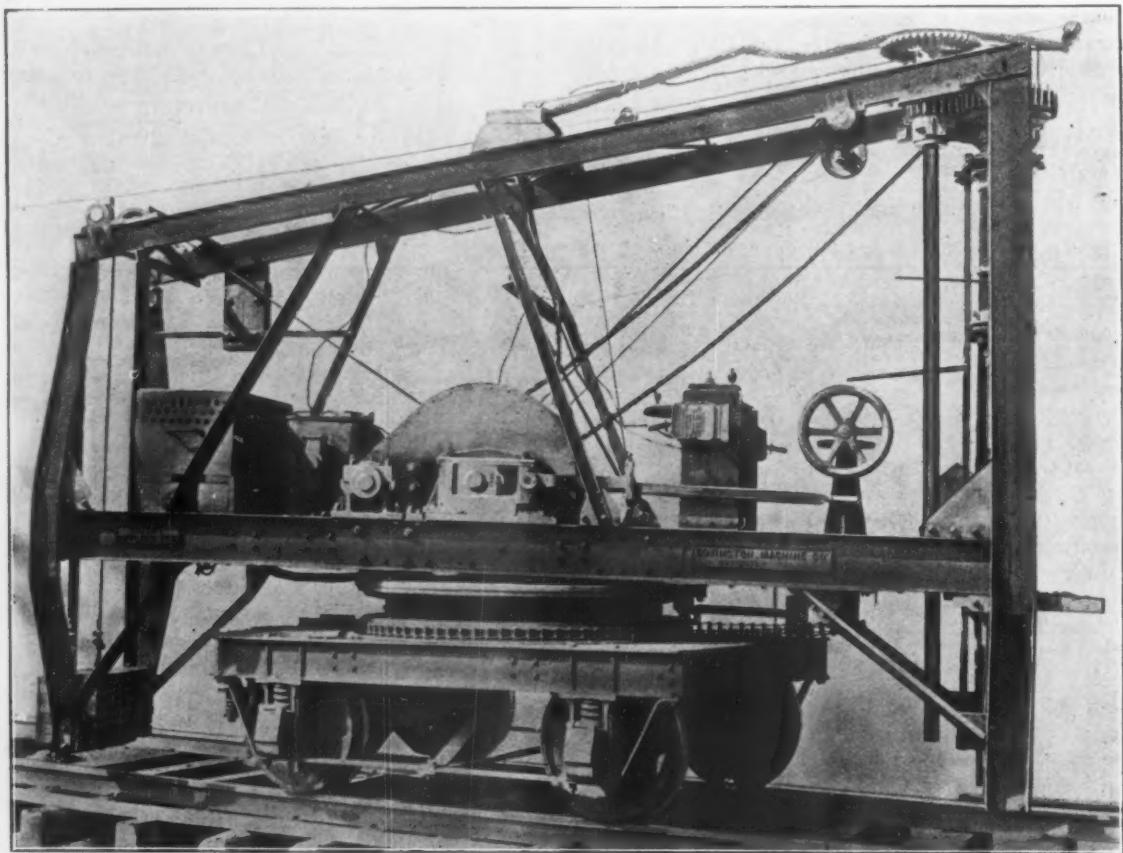


Fig. 1.—Coal Leveling Machine for Beehive Coke Ovens, Built by the Covington Machine Company, Covington, Va.

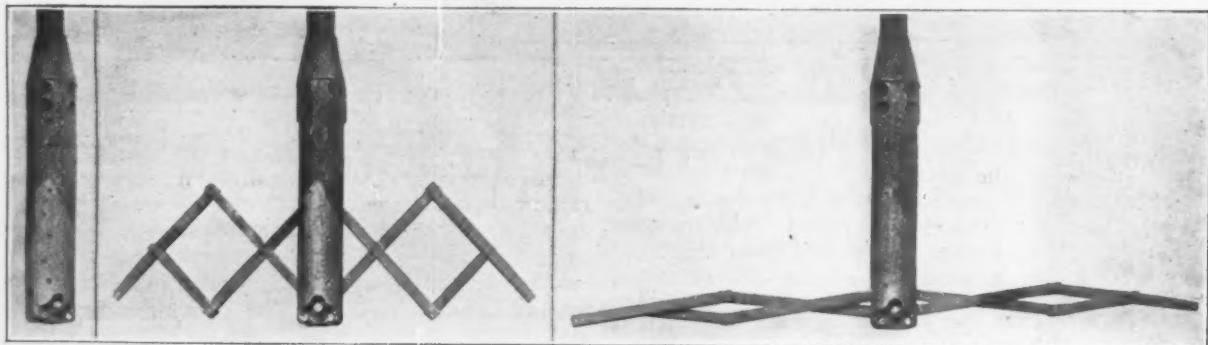


Fig. 2.—Leveling Shaft with Pantographic Arms, Closed, Partly Open and Fully Extended.

ing machine, described in *The Iron Age* August 10, 1905, and April 16, 1908.

One of these mechanical levelers has been in operation at the Continental No. 1 plant of the H. C. Frick Coke Company at Uniontown, Pa., for the past six months and has attracted much attention. This machine levels 185 ovens per day, finishing its task within 1 min. after the last oven is charged. It is operated by one man, and the saving in labor alone amounts to about \$14.50 per day. In addition, this machine makes it possible not only to burn off the usual charge put in an oven, but also allows the charging of approximately 7 per cent. more coal, thereby increasing the output of the plant and converting into

wheeled truck carrying a swinging frame, at one end of which is a vertical sliding leveling shaft which drops through the trunnel head and can be raised clear of the track if desired. The design of the machine throughout is such that it can be employed in connection with the existing equipment without additional installation expense, as it runs on the larry track, takes its power through the larry trolley, and operates through the trunnel head. The truck is driven by a standard 20-hp. motor geared to one of the axles. A similar motor is mounted on the swinging frame to control the movement of the leveling shaft. Two controllers, a hand wheel and two levers bring everything under easy and complete control of the operator. The

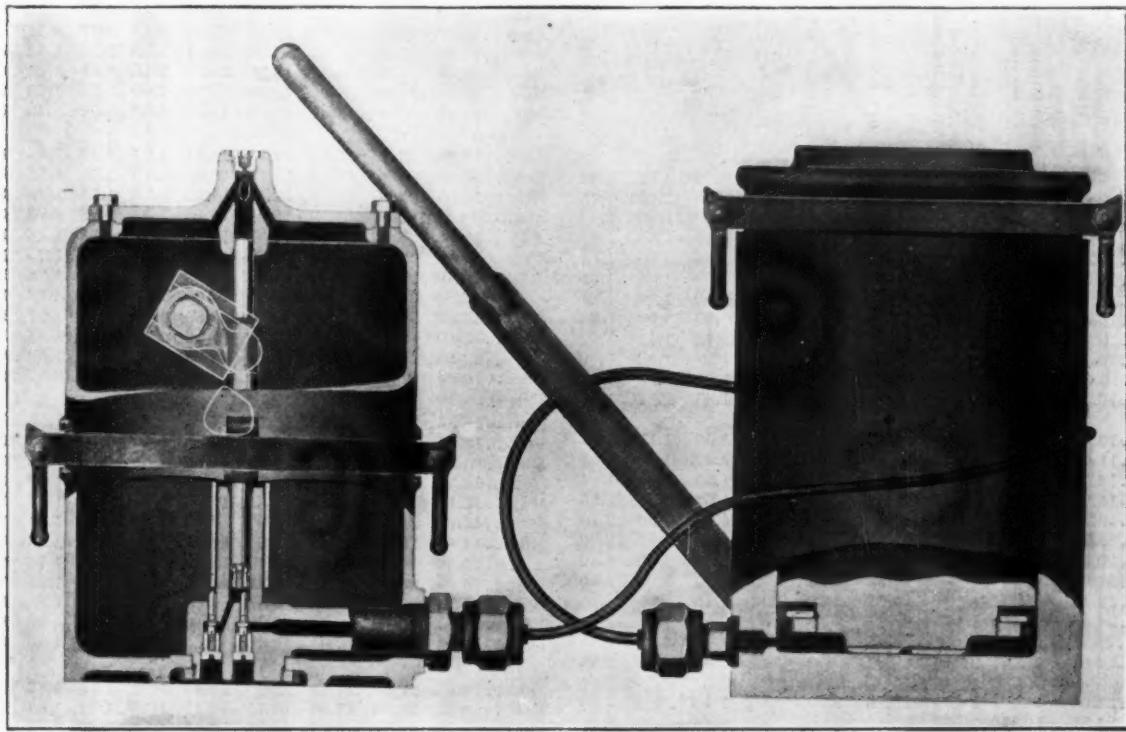
main vertical shaft is carried in a sliding cross-head that is guided by vertical ways and is raised or lowered by two wire cables wound on drums mounted on a shaft driven by friction gearing. This shaft is partially counterbalanced. By a hand lever the friction gearing is thrown in and the leveling shaft raised, while dropping the lever brings a brake into action and holds the shaft at any height.

The lower end of the leveling shaft is equipped with a pair of pantographic arms whose action is shown in Fig. 2. The left view shows the arms closed for passing through the trunnel head, while the other two show them half and entirely open. In operation the machine is moved to about the center of the oven and adjusted to the center of the trunnel head by the hand wheel. The shaft is then dropped into the oven and started revolving. A friction device operates an internal nut that, by moving a plunger rod within the shaft, spreads the arms until they are fully extended, by which time the oven is leveled. Reversing the

materially enlarged to meet the increased demand for its products. Arthur Reiche is manager of the Orenstein-Arthur Koppel Company in the Pittsburgh District, with offices in the Machesney Building, Pittsburgh, Pa.

#### Duff-Bethlehem Independent Pump Jacks.

A type of jack recently brought out by the Duff Mfg. Company, Pittsburgh, Pa., is intended for use in places where either it is inconvenient to operate an ordinary jack on account of lack of room or where the work handled is of a precarious nature. The construction is very simple, as the jack is made up of only three distinct parts—the cylinder and ram, the pump, and an 8-ft. length of flexible copper tubing. Forged steel is employed in the construction of the cylinder and the ram, which are very compact, and, it is stated, weigh considerably less than any similar type. The pump is an improved duplex model working on both the



The Duff-Bethlehem Forged Steel Independent Pump Jack Made by the Duff Mfg. Company, Pittsburgh, Pa.

motor closes the arms, the shaft is raised and the machine is ready for the next oven.

These machines can be built to level any size of oven and it is stated that they will operate equally well on double or single blocks of ovens, while they are fully as active as a larry on the track and do not interfere with the chargers.

**The Orenstein-Arthur Koppel Company.**—The interests of the Arthur Koppel Company have been consolidated with the Orenstein & Koppel Company, the combined corporation to be known in the future as the Orenstein-Arthur Koppel Company. The new corporation has a capital of \$6,500,000, with a surplus of \$2,000,000, and is the largest company in the world engaged in the designing, installing and manufacturing of narrow gauge railroads, including portable and industrial railroads, narrow gauge siding, narrow gauge public railroads and railroad equipment of all kinds. One of the specialties of this company is the individual transportation problem. It acts in the capacity of consulting engineer and is therefore able to render its customers every assistance in working out transportation problems. The capacity of the plant at Koppel, Pa., built a few years ago, has recently been

upward and downward motion of the plunger and so arranged that a light load can be lifted much more rapidly than a heavy one. The copper tubing is guaranteed to withstand a pressure of 10,000 lb. per square inch.

These jacks are used extensively in shipbuilding, and as they are constructed for use at any angle they are also of great service in boiler work. For bridge work one pump is employed to operate several jacks. There are many instances where this tool is often used for a crank pin or wheel press, as well as for regular work around a machine shop. It is claimed that the jack is practically a hydraulic press and can be put to many uses for which a hydraulic press is employed by making small modifications in the construction of the frame in which the jack is used. It is made in all capacities, from 100 to 500 tons, and with strokes ranging from 6 to 12 in.

The largest fee collected by the State of Indiana from a manufacturing corporation has been paid by the Indiana Steel Company, Gary, Ind., in connection with the company's increase of capital stock from \$1,000,000 to \$20,000,000. The fee was \$19,928.20.

# Fluctuations in the Prices of Iron and Steel Products for Twelve Years.

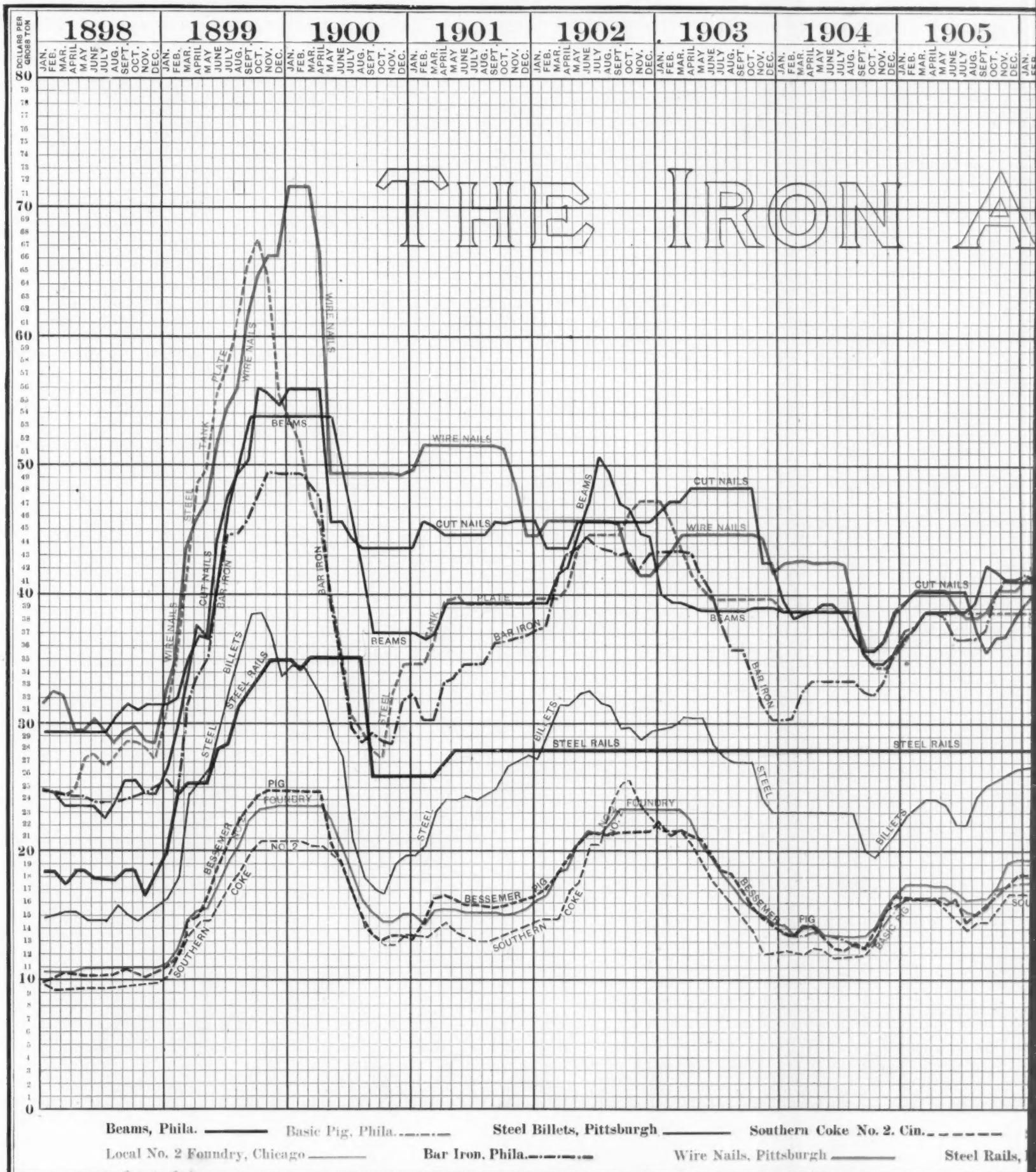
Monthly Averages Computed from Weekly Market Quotations of "The Iron Age" in the Period 1898-1909.

(With Supplement.)

Accompanying this issue of *The Iron Age* is our annual chart, in which lines are plotted to indicate the course of prices for pig iron, Bessemer steel billets and the leading forms of finished iron and steel in the 12 years ending with 1909. The diagrams are based on monthly averages of prices given week by week in our market reports from the leading selling centers. The figures on the margin of the chart stand for dollars and the black, red and blue lines represent prices per gross ton. The table below gives the monthly average prices:

Months.	Bessemer pig, Pittsburgh.	Steel billets, Pittsburgh.	So. No. 2 foun- dry, Cincinnati.	Local No. 2 foun- dry, Chicago.	Cut nails, Pittsburgh.	Tank plate, Philadelphia.	Beams, Phila- delphia.	Rod bar iron, Philadelphia.	Wire nails, Pittsburgh.
<b>1898</b>									
Jan.	9.87	14.93	9.50	11.35	1.10	1.10	1.30	1.11	1.42
Feb.	10.05	15.06	9.25	11.28	1.10	1.10	1.30	1.11	1.45
March.	10.39	15.25	9.25	11.10	1.10	1.08	1.30	1.06	1.43
April.	10.41	15.06	9.25	11.26	1.08	1.12	1.30	1.05	1.31
May.	10.30	14.85	9.37	11.35	1.08	1.21	1.30	1.05	1.31
June.	10.34	14.65	9.30	11.35	1.06	1.23	1.30	1.05	1.35
July.	10.25	14.50	9.25	11.35	1.06	1.20	1.30	1.00	1.31
Aug.	10.35	15.85	9.37	11.35	1.05	1.23	1.37	1.06	1.26
Sept.	10.78	16.00	9.55	11.35	1.08	1.27	1.40	1.14	1.32
Oct.	10.36	15.56	9.75	11.35	1.10	1.27	1.38	1.13	1.33
Nov.	10.15	15.06	9.75	11.35	1.10	1.25	1.35	1.10	1.28
Dec.	10.58	15.80	9.90	11.35	1.10	1.26	1.35	1.11	1.27
<b>1899</b>									
Jan.	10.87	16.62	10.31	11.47	1.18	1.35	1.40	1.15	1.43
Feb.	11.60	18.00	11.69	12.47	1.32	1.55	1.42	1.20	1.57
March.	14.59	24.30	13.75	14.95	1.48	1.89	1.55	1.41	1.94
April.	15.03	25.37	14.50	15.47	1.67	2.18	1.64	1.50	2.05
May.	16.20	26.75	14.56	15.72	1.65	2.23	1.63	1.56	2.10
June.	18.51	30.10	16.00	17.95	1.97	2.48	1.82	1.81	2.30
July.	20.65	33.12	17.56	19.22	2.12	2.58	2.08	2.00	2.42
Aug.	21.75	35.40	18.35	20.65	2.20	2.72	2.20	2.00	2.50
Sept.	23.43	38.37	19.94	22.22	2.45	2.92	2.40	2.05	2.76
Oct.	24.18	38.75	20.75	23.35	2.50	3.00	2.40	2.13	2.87
Nov.	24.78	36.50	20.75	23.45	2.48	2.87	2.40	2.21	2.95
Dec.	24.90	33.75	20.75	23.85	2.45	2.48	2.40	2.20	2.95
<b>1900</b>									
Jan.	24.90	34.50	20.69	23.85	2.50	2.38	2.40	2.20	3.20
Feb.	24.80	34.87	20.50	23.85	2.50	2.32	2.40	2.20	3.20
March.	24.72	33.00	20.30	23.85	2.50	2.10	2.40	2.18	3.20
April.	24.70	32.00	20.19	23.72	2.50	2.02	2.40	2.12	2.95
May.	21.00	28.90	19.75	22.65	2.05	1.75	2.40	1.77	2.20
June.	19.72	27.25	18.75	20.72	2.05	1.60	2.22	1.56	2.20
July.	16.75	21.00	16.81	18.60	1.97	1.37	2.05	1.33	2.20
Aug.	15.60	18.20	14.25	16.25	1.95	1.30	1.89	1.28	2.20
Sept.	13.87	16.93	13.62	15.35	1.95	1.25	1.65	1.30	2.20
Oct.	13.06	16.50	12.87	14.85	1.95	1.21	1.65	1.28	2.20
Nov.	13.48	18.95	12.95	14.85	1.95	1.44	1.65	1.28	2.20
Dec.	13.48	19.75	13.75	15.10	1.95	1.54	1.65	1.42	2.20
<b>1901</b>									
Jan.	13.15	19.75	13.45	15.10	1.95	1.55	1.65	1.44	2.22
Feb.	14.48	20.31	13.12	14.60	2.05	1.55	1.63	1.35	2.30
March.	16.31	22.88	14.00	15.60	2.01	1.62	1.64	1.35	2.30
April.	16.75	24.00	14.50	15.85	2.00	1.76	1.75	1.47	2.30
May.	16.30	24.00	13.85	15.85	2.00	1.78	1.75	1.51	2.30
June.	16.00	24.38	13.37	15.35	2.00	1.75	1.75	1.55	2.30
July.	16.00	24.00	13.00	15.35	2.00	1.75	1.75	1.55	2.30
Aug.	15.75	24.20	13.00	15.35	2.00	1.75	1.75	1.56	2.30
Sept.	15.75	24.88	13.06	15.35	2.05	1.75	1.75	1.61	2.30
Oct.	15.89	26.70	13.75	15.10	2.04	1.75	1.75	1.62	2.28
Nov.	16.00	27.00	14.00	15.23	2.05	1.75	1.75	1.64	2.17
Dec.	16.31	27.50	14.25	15.85	2.05	1.75	1.75	1.65	2.19
<b>1902</b>									
Jan.	16.70	27.50	14.55	16.25	2.05	1.78	1.75	1.66	1.99
Feb.	16.93	29.37	14.75	16.85	1.95	1.78	1.75	1.68	2.05
March.	17.37	31.25	14.75	18.51	1.95	1.78	1.85	1.84	2.05
April.	18.75	31.50	16.87	18.97	1.96	1.81	1.90	1.92	2.05
May.	20.75	32.20	18.35	20.85	2.05	1.95	1.99	1.96	2.05
June.	21.56	32.37	20.19	21.85	2.05	2.00	2.11	1.99	2.05
July.	21.60	31.75	20.75	21.60	2.05	2.00	2.27	1.95	2.05
Aug.	21.62	31.06	23.06	22.10	2.05	2.00	2.21	1.93	2.05
Sept.	21.75	29.50	25.00	23.35	2.05	2.00	2.10	1.92	2.03
Oct.	21.75	29.70	25.65	23.35	2.05	2.06	2.09	1.93	1.89
Nov.	21.68	28.50	23.62	23.35	2.05	2.10	2.00	1.87	1.85
Dec.	21.75	29.12	22.44	23.35	2.05	2.10	1.97	1.92	1.85

Months.	Bessemer pig, Pittsburgh.	Steel billets, Pittsburgh.	So. No. 2 foun- dry, Cincinnati.	Local No. 2 foun- dry, Chicago.	Cut nails, Pittsburgh.	Tank plate, Philadelphia.	Beams, Phila- delphia.	Rod bar iron, Philadelphia.	Wire nails, Pittsburgh.	
<b>1903</b>										
Jan.	22.15	29.60	...	21.65	23.45	2.07	2.10	1.78	1.93	1.89
Feb.	21.45	29.87	...	21.50	23.35	2.10	2.05	1.75	1.93	1.92
Mar.	21.85	30.62	...	21.37	23.22	2.10	1.94	1.75	1.94	2.00
April.	21.28	30.25	...	20.15	22.87	2.15	1.85	1.74	1.93	2.00
May.	20.01	30.37	...	18.87	20.72	2.15	1.80	1.73	1.86	2.00
June.	19.72	28.87	...	17.75	19.85	2.15	1.78	1.73	1.79	2.00
July.	18.89	27.60	...	16.15	18.25	2.15	1.77	1.73	1.69	2.00
Aug.	18.35	27.00	...	15.19	17.22	2.15	1.78	1.73	1.60	2.00
Sept.	17.22	27.00	...	14.75	16.41	2.15	1.78	1.73	1.60	2.00
Oct.	16.05	27.00	...	13.50	15.70	2.15	1.78	1.73	1.50	2.00
Nov.	15.18	24.00	...	12.00	15.10	1.90	1.78	1.73	1.40	1.97
Dec.	14.40	23.00	...	12.05	14.81	1.90	1.77	1.73	1.35	1.87
<b>1904</b>										
Jan.	13.91	23.00	13.90	12.37	14.47	1.77	1.73	1.73	1.35	1.89
Feb.	13.66	23.00	13.73	12.12	13.91	1.70	1.73	1.73	1.36	1.90
Mar.	14.25	23.00	13.78	12.10	14.05	1.72	1.73	1.73	1.45	1.91
April.	14.18	23.00	14.00	12.50	14.35	1.74	1.73	1.73	1.48	1.90
May.	13.60	23.00	13.81	12.25	13.85	1.75	1.73	1.73	1.48	1.90
June.	12.81	23.00	13.53	11.80	13.70	1.75	1.73	1.73	1.48	1.90
July.	12.40	23.00	13.04	11.81	13.60	1.72	1.73	1.73	1.48	1.89
Aug.	12.81	23.00	12.81	12.00	13.60	1.65	1.73	1.73	1.48	1.71
Sept.	12.63	20.00	12.73	12.00	13.85	1.60	1.57	1.57	1.45	1.60
Oct.	13.10	19.50	13.21	12.81	14.10	1.60	1.53	1.53	1.43	1.60
Nov.	14.85	20.25	14.56	15.19	15.98	1.62	1.53	1.53	1.47	1.62
Dec.	16.65	21.20	15.75	15.85	16.95	1.73	1.57	1.57	1.60	1.73
<b>1905</b>										
Jan.	18.35	26.25	17.89	16.75	17.85	1.75	1.63	1.63	1.65	1.75
Feb.	18.41	23.50	16.50	16.25	17.85	1.79	1.66	1.66	1.68	1.80
Mar.	18.35	24.00	16.69	16.25	17.80	1.80				

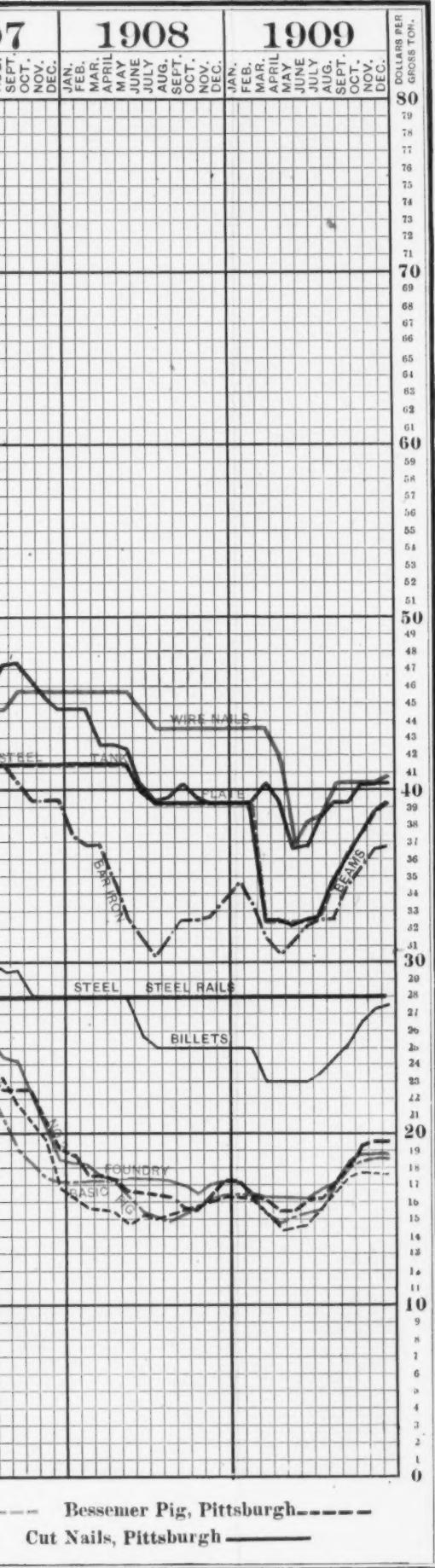


Fluctuations in the Prices of Crude and Finis  
from January 1, 1898, to January 1, 1910



Billets, Pittsburgh ————— Southern Coke No. 2, Cin. ————— Steel Tank Plate, Phila. —————  
 Wire Nails, Pittsburgh ————— Steel Rails, Eastern Mill ————— Cut

Prices of Crude and Finished Iron and Steel, from January 1, 1898, to January 1, 1910—Gross Tons



and Steel  
ons.



Months.	Bessemer pig, Pittsburgh.	Steel billets, Pittsburgh.	Basic Pig, Philadelphia.	No. 2 foun- dry, Cincinnati.	Local No. 2 foun- dry, Chicago.	Cut nails, Pittsburgh.	Tank plate, Philadelphia.	Beams, Phila- delphia.	Re'd bar iron, Philadelphia.	Wire nails, Pittsburgh.
<b>1900</b>										
Jan.	17.34	25.00	16.75	16.25	17.35	1.75	1.75	1.75	1.54	1.95
Feb.	16.78	25.00	16.56	16.13	16.75	1.75	1.75	1.75	1.48	1.95
Mar.	16.25	23.00	15.60	15.05	16.50	1.80	1.45	1.45	1.39	1.95
April.	15.78	23.00	15.00	14.25	16.50	1.75	1.45	1.45	1.36	1.87
May.	15.84	23.00	15.13	14.50	16.50	1.64	1.45	1.43	1.39	1.65
June	16.05	23.00	15.50	14.70	16.50	1.65	1.45	1.45	1.43	1.70
July.	16.46	23.50	15.88	15.75	17.00	1.71	1.46	1.46	1.45	1.72
Aug.	17.03	24.13	17.06	16.38	17.13	1.75	1.55	1.55	1.45	1.80
Sept.	18.05	25.00	18.13	17.35	18.70	1.75	1.62	1.61	1.52	1.80
Oct.	19.53	26.25	18.38	17.88	19.00	1.80	1.66	1.66	1.58	1.80
Nov.	19.90	27.13	18.81	17.75	19.00	1.80	1.74	1.74	1.64	1.80
Dec.	19.90	27.50	18.75	17.45	19.00	1.80	1.75	1.75	1.65	1.85

In plotting the lines those representing finished material have been derived by multiplying the market prices of finished material per pound by 2240, so that the traversing lines would show the exact relation between like quantities of all products. In the table, however, while pig iron and steel billet prices are in dollars per gross ton those for finished material are stated in the usual way, namely, in cents per pound. In the case of local No. 2 foundry iron, Chicago, the prices given in the present chart are f.o.b. Chicago District foundries, a 35-cent switching charge having been added to the figures as found in the charts of previous years.

The prices taken are in all cases those for early delivery. The twelve years covered constitute a peculiarly interesting period in the American iron trade. Of special significance are the lines in the left hand portion of the chart which emphasize the low levels of 1898, the spectacular advances of 1899 and the equally noteworthy declines of 1900. The fairly steady prices of 1901, advancing in the latter part of the year, are followed by another series of high points in 1902, which, however, are very moderate compared with those of 1899. The sharp decline of 1903 is distinctly shown; the slight further decline extending over nine months of 1904, with advances in the latter part of the year; some reaction in 1905, followed by advances in the latter part of the year leading to the comparatively stable level of the first half of 1906. Then came the strong movement upward, carrying prices to substantially the levels of 1902, followed by recessions after the middle of 1907, which continued with some fluctuations to the middle of 1909. The improvement in the second half of 1909 is distinctly shown.

#### Automatic Transporting Devices.

A new type of transportation equipment possessing novel features and adapted to the handling of passengers and all classes of materials and packages is being built at the factory of the Automatic Transportation Company, Buffalo, N. Y., and will be installed in a short time. Eventually, a large number of electric automatic transportation devices will be manufactured, but at the present time only five have been developed to the point of having commercial applications.

The first of these is a rural mail and parcel delivery device. This system is specially adapted for transporting farm products of every nature to market and bringing back purchased supplies. Y-shaped metal poles support a double steel track, which is from 12 to 20 ft. above the ground except at the stations, where it is depressed and entirely accessible. These routes radiate from a central despatching station in loops, and the mail and parcels for each farmer on that line are arranged in boxes and attached to the carrier in the order in which the residences are located. Between stations the carriers are designed to operate at a speed of about 25 miles an hour, but upon approaching a sta-

tion the carrier automatically slackens speed, deposits the mail in a box, locks it, picks up the outgoing mail, rings a bell in the house to notify the occupants that the mail has been delivered, and goes on its way with an almost instant acceleration. There is practically no danger of bad weather blocking the line, as the power is transmitted to the car through an inverted V-shaped groove that is amply protected from the elements. The rails can also be used to furnish telephone service if desired. One of these lines will be installed in the State of Michigan shortly.

An automatic carrier for bulky material, such as ore, coal, gravel and lumber, is another of the devices which have been developed, and one of these systems will be installed at a Pennsylvania coal mine early in the year. The structural features of this device are practically the same as those of the parcel delivery system, and the operation characteristics are almost identical. The cars employed will take ore direct from the mine, dump it into railroad cars or on a stock pile automatically, and return for another load. This system may be installed to transport all classes of bulky materials over any character of country and distance from a few hundred feet to 20 or 30 miles. By the use of this system it is claimed that mines which heretofore have remained undeveloped on account of the distance from the railroads can be operated at a margin of profit.

For handling package freight at railroad and steamship terminals and about manufacturing plants an electric truck and scale has been devised. This truck operates over a system of flexible and movable tracks, mounted on wheels, so that changes in length and location can be made to meet conditions. The carrier running over these tracks is designed for either automatic operation or by an attendant and is equipped with a scale which records the individual weight of each separate package and at the same time shows the combined weight of the entire load. In use the freight can be received directly from the shippers on the truck scales and, when the weight is ascertained, moved directly into the car designated, thus eliminating all hand trucking and giving economical service.

In large cities an underground tube system can be installed to facilitate the delivery of mail and merchandise between the center of cities and the outlying districts. This will be just the same as the rural mail delivery system, except that it will be installed underground and deliveries will be made to stations located in the centers of the different suburbs and the parcels sent out from there by wagons or messengers. A somewhat similar system for rapid transportation of mail and express matter, merchandise and passengers between cities at high rates of speed is being developed at the present time.

The Duluth-Vermillion Company, Duluth, Minn., has been incorporated with \$600,000 capital to develop an ore property on the Duluth & Iron Range Railroad in the Robinson Lake basin. The company has leased property extending half a mile along the main iron formation. It is stated that three drills are operating on adjoining property, and extensive bodies of high grade ore have been located along this formation. One-half the capital stock will be held in the treasury and \$200,000 goes as a bonus to the owner of the fee, who also receives a royalty of 25 cents per ton. The directors are Charles D. Brewer, Elmer N. Whyte, L. B. Manley, Dr. S. R. Holden and John B. Bisbee.

New York City's newest and greatest bridge, the Manhattan, was opened formally to pedestrians and vehicles December 31. This is the fourth bridge spanning the East River. The first contract for its construction was let in May, 1901. It is a suspension bridge, similar in construction to the Brooklyn and Williamsburg bridges, but of much greater capacity.

## THE PITTSBURGH IRON TRADE IN 1909.

BY ROBERT A. WALKER.

The year just ended, particularly the second half, was one of the best six months the iron trade has ever known, from a tonnage standpoint. From October, 1907, until about April, 1909, this country had passed through one of the most severe periods of industrial and general business depression in its history. Confidence seemed to be entirely lacking and credit lines were drawn more sharply than ever before. The part played by the United States Steel Corporation and the other large steel interests in working closely with each other for the whole of 1908, preventing absolute demoralization in prices, is a matter of record and need not be discussed at length. In the last few months of 1908 and the beginning of 1909, however, it became evident that under this policy the consumers of iron and steel would place orders only for such material as they actually needed, as they contended that conditions existing were artificial and they were fearful that prices might break at any time.

For several months prices had been more or less shaded, and the situation became decidedly unsatisfactory from every standpoint. A meeting of practically all of the leading steel interests was held February 18 in New York City, and after a careful canvass of the situation it was decided to abandon all further attempts to hold prices, and the next day the "open market" was declared. Then commenced a scramble for orders and contracts, the equal of which this country has never seen. The larger steel interests through their superb selling organizations commenced to rake the country thoroughly. Consumers' and distributers' warehouses were bare of stocks, as for 18 months there had been as little buying as possible. At the start, plates and structural material were reduced \$6 to \$7 a ton, steel bars \$4 to \$5 a ton, pipe \$10 to \$12 a ton and other finished material in proportion. Pig iron declined sharply and billets went as low as \$20 at mill in the Central West, although possibly only one lot sold at this price.

It took some time to convince consumers that the bottom of the market had been reached, but once this was accomplished, and this came in April, a buying movement set in that promised to swamp the mills. In about three months a wonderful change had come over the situation. Blast furnaces, steel works, sheet and tin mills, pipe mills and other manufacturing plants that had been long idle commenced to start up, and by October production was again on a maximum basis. It is true that much of the enormous tonnage taken by the mills was at low prices, and possibly in some cases there was no profit, but the object sought had been attained. The whole country was again buying steel and as order books commenced to fill up, prices began to improve. Hundreds of thousands of tons of steel bars were booked at 1.10 and 1.15 cents, Pittsburgh, plates and structural material at 1.15 cents, or lower in some cases, Bessemer and open hearth billets at \$21 to \$22 for long delivery ahead and sheet bars at \$23 to \$24. In most cases, consumers were not allowed to cover for more than three months at these prices, but in the case of steel bars, where competition was particularly active, some contracts were taken up to the close of the year.

In May and June the large steel companies commenced to get more independent as their order books were rapidly filling up, with the natural result that prices began to improve. Low quotations were withdrawn, but this only had the effect of bringing out a heavier demand, and by October some of the large steel interests were filled for the rest of the year and had heavy orders on their books for the first quarter

of 1910. In the last three months of the year, the large steel interests such as Carnegie, Jones & Laughlin, Republic, La Belle Iron Works and others were accepting business only for shipment at convenience of the mill. By November steel bars had recovered in price from about 1.10 cents, the lowest, to 1.50 cents and higher for prompt delivery, plates and structural material from 1.15 cents to 1.50 and 1.55 cents, steel billets from about \$21 to \$28 and \$29 and sheet and tin bars from \$23 and \$24 to \$29 and \$30, several small lots having sold at the higher price for delivery in the first quarter of 1910. Consumers of billets and bars were having trouble in getting deliveries, and there was not enough steel to go round. Other lines of finished iron and steel also advanced in price, and it would be hard to imagine a greater difference in conditions in the steel trade than when the year opened.

One great help in restoring normal conditions in the steel trade was the entrance of the railroads into the market as buyers of steel cars, engines and other equipment. The purchases of steel rails by the railroads in 1909 were not as heavy as anticipated, but it is said that none of the railroads have bought enough rails to meet requirements for 1910, and a liberal buying movement in this line early in 1910 is confidently expected. There were no serious financial disturbances in 1909 and money was plentiful during the whole year. Crops were also heavy. From every standpoint, the last half of 1909 in the steel trade was very satisfactory. The net earnings of the United States Steel Corporation increased remarkably and in the last published quarter had reached the enormous sum of \$38,000,000. It is a poorly located or badly managed manufacturing proposition that did not show a profit at the close of 1909, and the earnings of the railroads also showed heavy increases, and prosperity existed in all lines of trade.

### New Construction.

The first half of the year 1909 was very dull in the building of new plants, due to the long depression in the steel trade, which caused many concerns having improvements under way, to stop work until financial and general business conditions improved. New erection in the Pittsburgh District in 1909 was very light, no important new plants having been projected.

The principal new work under erection in the Pittsburgh District is the plant of the Jones & Laughlin Steel Company at Aliquippa, Pa., initial work on which was started nearly three years ago. A good deal was done on the plant in 1907, but in the early part of 1908 operations were practically suspended owing to the depression and were not resumed again until early in 1909. More detailed reference to the Aliquippa plant and to other new construction now under way in the Pittsburgh and Valley districts or now planned to be undertaken in 1910 is made in a separate article elsewhere. What is given here refers to work completed in 1909 and to plants first put in operation in that year.

The Carnegie Steel Company completed early last year two blast furnaces and 12 open hearth steel furnaces at Duquesne. These have been in successful operation for some months. Two finishing mills were also added to the Duquesne plant for the rolling of small shapes. At the Ohio works of the Carnegie Steel Company, Youngstown, Ohio, two new blast furnaces, each of 500 tons daily capacity, and 12 50-ton open hearth furnaces were started last year. A description of the open hearth plant appeared in *The Iron Age* of September 17, 1908.

It is not improbable that the National Tube Company, Pittsburgh, will shortly make announcement of its intention to build large tube mills at Gary, Ind., for supplying the Western trade, but absolutely nothing official on this can be learned at present.

The only addition to equipment made by the La Belle Iron Works at Steubenville, Ohio, last year, was the building of a large metal mixer. The entire plant of this company, embracing two blast furnaces, open hearth steel works, plate and pipe mills and sheet and skelp mill, has been in practically full operation most of the year, making a successful record.

The Republic Iron & Steel Company added a 20-in. continuous skelp mill at its Brown-Bonnell Department, Youngstown, Ohio, in 1909, and started work on a new 10-in. skelp mill which it expects to have in operation by March. The important new work under way at Haselton is spoken of elsewhere.

The Brier Hill Iron & Coal Company, operating Grace Furnace at Youngstown, added four fire brick stoves of the McClure type,  $20\frac{1}{2} \times 90$  ft.

The Youngstown Sheet & Tube Company, Youngstown, made large additions to its plant, these including two butt weld pipe mills, one lap weld mill for making pipe from 10 to 20 in. diameter, eight hot sheet mills and four cold mills. The sheet mill will be ready for operation early in the new year. The company also made extensive additions to its wire plant at Haselton, Ohio, bought several years ago from the Morgan Spring Company, practically doubling its capacity in rods, wire and wire nails. A large warehouse is also being built at the wire plant.

The Youngstown Iron & Steel Roofing Company, at Youngstown, installed in 1909 two hot sheet mills, two sets of cold mills and one galvanizing pot. Other improvements are contemplated, but plans have not been fully made.

The William B. Pollock Company, Youngstown, builder of steel plate construction for blast furnaces and steel works, built and placed in operation a 500-ft. smith and drop forge shop of iron and steel construction, equipped with modern machinery throughout. It also added to its large storage yards area and installed a third gantry crane for covering them. At present, important contracts on hand by this company include all the iron and steel plate work for the new blast furnace of the Andrews & Hitchcock Iron Company at Hubbard, the new furnace of the Youngstown Sheet & Tube Company at East Youngstown, Ohio, and the new furnace of the Republic Iron & Steel Company at Haselton, Ohio.

The West Penn Steel Company, a new organization, built an open hearth steel plant at Brackenridge, Pa., containing one 60-ton furnace, and also built sheet mills, this plant now being in operation.

In 1909 the Allegheny Steel Company added two new open hearth furnaces to its plant and absorbed the Interstate Steel Company, which had a plant containing six hot mills and five cold mills, its product being sheets for special purposes and its capacity about 25,000 tons a year. The Allegheny Steel Company also absorbed the Reliance Tube Company, which operated a plant at Brackenridge, Pa., for the manufacture of small tubes, and it further built during the year a new washer factory with a capacity of five tons per day.

The Superior Steel Company, Carnegie, Pa., manufacturer of hot and cold rolled strip steel, made material additions to its plant last year, including several open hearth furnaces, and which considerably increased its capacity.

In the latter half of 1909 long delayed new construction and repair work were actively taken up with the revival in the steel trade, and large contracts for the building of new plants and the remodeling of old ones soon placed the concerns building iron and steel works machinery in a busier condition than they had been in some months. The principal builders of iron

and steel works machinery in the Pittsburgh District, these being the United Engineering & Foundry Company, Mesta Machine Company, A. Garrison Foundry Company, Lewis Foundry & Machine Company and Seaman-Sleeth Company, the last named making rolls exclusively, were well filled up with work at the close of the year, and were bidding on other very large contracts. All indications are that the different builders of rolling mills, steel works and other equipment will be fully employed during 1910, and in fact several of the leading concerns have about all the work they can take care of during the first four months of the year.

#### Pig Iron.

The first half of 1909 was somewhat lean in the pig iron trade, but the second half saw some records made in output and these promise to be eclipsed during the year on which we have just entered. In the Pittsburgh District proper, there is a total of 50 blast furnaces. As showing the active condition of trade, and the heavy demand for steel making irons, it can be stated that at the close of the year all of these furnaces were in blast, making nearly 25 per cent. of the total output of the entire country.

*Bessemer Pig.*—On January 1, 1909, Bessemer pig iron was quiet and selling at about \$16.50, Valley furnace, or \$17.40, Pittsburgh. Early in February a marked weakness occurred and at the close of the month the price was nominally at \$15.50, but with reports of sales at slightly lower prices. At the end of March it had declined to \$15, Valley furnace, and by the middle of April had gone down to about \$14.50. This was the low point of the year. Commencing with May, prices steadily improved. In early June the price reached \$15; by July 1, \$15.25, and in early August \$16. At this time there were heavy inquiries in the market. Early in August, W. P. Snyder & Co. sold to the Republic Iron & Steel Company 15,000 tons of Bessemer iron and the Bessemer Pig Iron Association sold the Youngstown Sheet & Tube Company 10,000 tons, both at \$16. This was the beginning of a heavy buying movement in Bessemer iron by leading steel producers, such as the Republic Iron & Steel Company, Jones & Laughlin Steel Company, the Youngstown Sheet & Tube Company, the Lackawanna Steel Company and the Cambria Steel Company. In early October, Bessemer iron had reached \$18 at furnace, and by the middle of that month had gone to \$18.50. In November and early December heavy sales were made at \$19 for delivery in the first quarter of 1910. The year closed with Bessemer iron ruling firm at \$19 at furnace.

*Basic Iron.*—The range in prices in basic iron in 1909 was almost as great as in Bessemer, and transactions were fairly heavy, especially in the latter half of the year. The year opened with basic iron selling at \$15.25 to \$15.50, at Valley furnace, but in March the market had declined to \$15, with sales reported under that price. In early April the market was very dull, and the price fell to about \$14, several sales having been made as low as \$13.85. In the latter part of May the market commenced to improve, and when July was reached the price had gone to \$15, and the demand was active. In early August basic iron was firm at \$15.25, and the price steadily improved from that time forward. In November the market was firm at \$17 for delivery over November and December and was quoted at \$17.25 to \$17.50 for first quarter. In December the price showed a slight decline, owing to the heavy output, and the year closed with the general quotation of \$17, some sellers quoting slightly higher.

*Foundry Iron.*—The range in prices of foundry iron during 1909 was not as great as on Bessemer and basic. The year opened with No. 2 selling at about \$15.50, Valley furnace, but it declined in sympathy with Bessemer and basic until it was freely offered as low as \$14 in May, with very little demand. By the middle of June prices commenced to improve and when July was

reached it was fairly active in demand and firm at \$15. The price continued to advance slowly during the last six months of the year and at the end of December No. 2 foundry was selling at \$17 to \$17.25, but was rather quiet in demand.

*Forge Iron.*—The output and consumption of forge iron in the Pittsburgh District were relatively small. The year opened with the market ruling at about \$14.50, Valley furnace, and the demand quiet. In March the price had declined to \$14 or lower, and when April was reached was weak at \$13.50. By the middle of June prices commenced to show improvement and recovery was gradual until the close of the year at which time forge iron was sold at about \$16.50, but transactions were few.

The following table shows the average monthly prices of Bessemer, basic, No. 2 foundry and gray forge iron f.o.b., Valley furnace during 1909, the freight rate to the Pittsburgh District being 90 cents a ton:

*Pig Iron Prices, f.o.b. Valley Furnace.*

Month, 1909.	Bessemer.	Basic.	No. 2 foundry.	Gray forge.
January	\$16.40	\$15.50	\$15.45	\$14.50
February	15.87	15.19	15.06	14.19
March	15.30	14.80	14.35	13.70
April	14.87	14.06	14.00	13.50
May	14.94	14.12	14.19	13.50
June	15.15	14.70	14.90	13.90
July	15.55	15.10	15.15	13.90
August	16.12	15.31	15.35	14.40
September	17.15	15.90	15.95	15.10
October	18.62	16.94	17.12	16.13
November	19.00	17.25	17.19	16.29
December	19.00	17.06	17.00	16.50

#### Steel Billets.

The first half of the year in the steel billet and sheet and tin bar trades was unsatisfactory, but commencing with June the demand improved and when October and November were reached there was almost a famine, the mills being badly oversold and far behind in deliveries.

The additions to capacity in the Pittsburgh District for producing Bessemer and open hearth steel during 1909 were not very large, consisting mostly of additions to existing plants, but there promises to be a material increase in capacity for making open hearth steel during 1910. During the year, the West Penn Steel Company built a new open hearth steel plant at Brackenridge, Pa., while the Superior Steel Company also built an open hearth plant at Carnegie, Pa., and the Allegheny Steel Company and one or two other concerns made slight additions to capacity. The Forged Steel Wheel Company, an identified interest of the Standard Steel Car Company, has under way at Butler, Pa., the building of an open hearth steel plant to contain six 50-ton furnaces, and which will likely be ready for operation about the middle of 1910.

The year opened with the prices in effect on steel being \$25 for 4 x 4-in. Bessemer and open hearth billets up to 0.25 carbon, forging billets taking an advance of \$2 a ton over rolled billets, while sheet and tin bars in long lengths were \$27.50 f.o.b., Pittsburgh. The demand for steel was very dull, most finishing mills operating to half capacity or less, and there is no doubt that these prices were being materially shaded. In February the open market was declared and for a time it was a question what prices were ruling on steel. About March 1 a fair-sized tonnage of rolling billets for spot shipment was sold on the basis of \$20, at mill, this price probably marking the lowest point reached.

The market on billets then went along from \$22 to \$23, while sheet and tin bars were about \$24 to \$25. Little new business was being offered, consumers not urgently needing steel and buying only as their actual needs demanded. The supposed prices of \$23 for billets and \$25 for sheet and tin bars were being materially shaded through April and May, but in the early part of June, the market commenced to harden,

and when July was reached, Bessemer billets were firm at \$23, open hearth \$24 to \$25 and sheet and tin bars \$25, Pittsburgh. From this time on, prices showed steady improvement, and in October and November there was a scarcity in supply of steel, many of the finishing mills being unable to get deliveries and were restricted in operations on this account.

In October, Bessemer billets were quoted at \$27, open hearth \$27.50 to \$28 and sheet and tin bars about \$28. The year closed with Bessemer billets ruling at about \$27.50, open hearth \$28.50 and sheet tin bars \$29 to \$29.50, although some sales of bars for first quarter were reported as high as \$30, maker's mill. Indications are that the steel making capacity of the entire country will be fully employed for the first half of this year at least.

#### Finished Iron and Steel.

The demand for all kinds of finished iron and steel was excessively dull in the opening months of 1909, largely due to the fact that consumers had little confidence in the prices that were being quoted, these being considered largely artificial and did not represent the actual market. Buyers were afraid to place orders, except for such material as they actually needed, not knowing at what time prices might give away. That this view of the matter was the right one was shown by the break in the market which came in February, and which resulted in reductions in prices on practically all kinds of finished iron and steel ranging from \$4 to \$12 a ton.

*Structural Shapes.*—In the beginning of 1909, the demand for structural steel was exceedingly quiet, due to the fact that building operations had been largely suspended, and also because the mills were holding prices on beams and channels up to 15-in. on a 1.60 cents basis, which was regarded as artificial. Plain material was selling at less than 1.60 cents, but this was not done openly. When the market came, the first official reduction in the beams and channels was \$6 a ton, or down to 1.30 cents. The demand did not respond this price, and conditions did not improve. In May some large inquiries came out, and the mills were naming 1.20 to 1.25 cents on plain material, and heavy business was booked at these prices, some of which ran into July and in a few cases for a longer period. The market finally firmed up to 1.30 cents in July, but an enormous amount of business had been booked at lower figures. From July on the demand steadily improved and in October the mills were booked up for the remainder of the year, and had a good deal on their books for the first two or three months of 1910. Prices steadily improved and at the close of the year the absolute minimum on beams and channels to the most favored buyers was 1.50 cents, with most of the business being placed at 1.55 to 1.60 cents at mill.

*Plates.*—The year opened with the official price of plates at 1.60 cents for  $\frac{1}{4}$ -in. and heavier, but for several months this price had been shaded and confidence of buyers in the future market was entirely lacking. When the open market was declared, the first reduction in price of plates was \$6 a ton, or to 1.30 cents, but this was also artificial as plates sold in large lots as low as 1.20 cents, and in some cases lower was done. In May and June the railroads came in the market with orders for steel cars and boiler shops and other works using plates were getting busier, and the demand in second half of the year was enormously heavy and beyond the capacity of the mills to meet promptly. By October and November the leading plate mills were sold up three or four months ahead, and plates for prompt shipment were commanding premiums. Prices on plates steadily improved from May, and the year closed with  $\frac{1}{4}$ -in. and heavier selling at 1.55 to 1.60 cents, depending on the size of the order and deliveries wanted by the customer.

**Bars.**—The market on iron and steel bars in the first half of 1909 was exceedingly quiet, the mills endeavoring to hold steel bars prior to February 19 at 1.40 cents, this price having been adopted June 1, 1908, at which a reduction of \$4 a ton was made. After the break in the market, steel bars were put down to 1.20 cents. This low price did not bring out any material increase in orders, and the mills then started on a wild scramble for business, favored contracts having been taken at 1.10 and 1.15 cents and in some cases for delivery through all of the year. With the placing of these heavy contracts, the mills got stronger in their ideas as to prices, and in September and October the principal steel bar mills were booked up for months ahead and fell much behind in shipments. Prices steadily improved and the year closed with steel bars ruling at 1.50 to 1.55 cents for reasonably prompt shipment, but the mills were booking contracts from regular customers at 1.45 cents for delivery in first quarter and first half, and in some cases, for very desirable orders and to favored customers, 1.40 cents was being done. The market on iron bars through 1909 was very similar to steel bars, the year opening with a dull demand and the price ruling at 1.42 cents, Pittsburgh, for delivery in the Chicago District, and 1.50 cents for delivery in the Pittsburgh District. When the break in the market came in February, iron bars were freely offered at 1.30 to 1.35 cents, but in some cases lower prices were made. With the swell in orders which commenced in May and June, prices on iron bars steadily improved, and the year closed with the market ruling at about 1.70 cents, Pittsburgh, the mills having a good deal of tonnage on their books for delivery through first quarter.

**Hoops and Bands.**—With the break in the market in February, makers of hoops and bands who had been trying to maintain prices on the basis of 1.80 cents, made a reduction of \$4 a ton, or to 1.60 cents, and steel bands were reduced from 1.40 to 1.20 cents, or \$4 a ton. These prices, however, did not bring out any material increase in orders, and in June hoops sold as low as 1.35 cents and bands at 1.15 cents or less. From this time on the demand was getting heavier and prices commenced to improve. The year closed with the mills pretty well filled with orders, hoops ruling at about 1.50 cents for forward shipment, and bands at 1.45 cents at mill.

**Sheets.**—The year opened with the demand light and the mills not operating to more than half capacity. Official prices were being more or less shaded. In the first week of 1909, the official price on No. 28 black sheets was 2.50 cents and No. 28 galvanized 3.55 cents. These prices remained nominally unchanged until the break in the market came, when the sheet mills adopted the policy of naming prices only when definite specifications were offered. Material concessions were being made, however, No. 28 black selling as low as 2.15 cents, and No. 28 galvanized at 3.15 cents. In April and May the demand commenced to recover and with the opening of June, prices were firmer. No actual advance came, however, until September 28, at which time black and galvanized sheets were advanced \$2 a ton, making No. 28 black sheets 2.30 cents and No. 28 galvanized 3.35 cents. At this time the mills were pretty well filled up and the sheet market was in more satisfactory shape than for a long time. On November 11 the mills made another advance of \$1 a ton on blue annealed sheets, \$2 on box annealed black, \$3 a ton on galvanized and 10 cents per square on painted corrugated roofing sheets and 15 cents a square on galvanized. This made No. 28 black sheets 2.40 cents and No. 28 galvanized 3.50 cents at mill. These prices continued in effect until the close of the year. The demand for black and galvanized sheets in the last three months of the year was heavy, the mills being considerably behind in shipments. The close of 1909 found the leading sheet mills pretty well sold up for the first quarter of the new year and with a good

many contracts booked for delivery through the first half.

**Tin Plates.**—In sympathy with other lines of iron and steel, the demand for tin plates at the opening of the year was very quiet, and prices were only fairly strong and were on the basis of \$3.70 per base box, f.o.b. Pittsburgh, for 100-lb. cokes. This price, however, was being shaded, as the mills were all keen for business. When the break in the market came in February prices on tin plates were in the same position as other lines of finished material, the market being practically open and the mills making any prices they saw fit to secure business. Consumption, however, was very light and such inducements as were made led to a very small movement among buyers.

This condition continued in force until March 11, on which date the American Sheet & Tin Plate Company made a reduction of 25 cents per base box, or from \$3.65 to \$3.40, f.o.b. Pittsburgh, for 100-lb. cokes. After this reduction was made the demand improved to some extent, and the mills commenced to get busier. This price continued in force until September 28, on which date an advance of 10 cents per base box, or from \$3.40 to \$3.50 on 100-lb. cokes, was made, and in November another advance of 10 cents per base box was made, or from \$3.50 to \$3.60 for 100-lb. cokes, f.o.b. Pittsburgh. This price continued in force until the close of the year.

In the last six months the demand for tin and terne plates was very active, and the orders entered during the year by the leading tin plate mills compared very favorably with the previous good years, and were much larger than in 1908. The tin plate mills entered 1910 with heavy orders on their books for first quarter and first half of the year delivery, and the outlook is that the mills will be fully employed for the first half of the year, and perhaps through the entire year. The production will be greatly increased in 1910, however, by the building of new mills.

**Merchant Pipe.**—In this trade the year 1909 opened with demand dull, and regular discounts more or less shaded. When the open market was declared in February the leading pipe mills issued new discounts on merchant pipe, showing reductions of \$6 to \$10 a ton, and also on boiler tubes, showing a reduction of \$6 on all sizes, except 2 $\frac{3}{4}$  to 5-in., which were reduced \$10 a ton. These heavy reductions in prices did not stimulate the demand to any extent, but trade continued quiet, the new discounts being shaded in some cases. The low discounts of 8 $\frac{1}{2}$  and 5 per cent. on  $\frac{3}{4}$  to 6-in. steel pipe continued in force until October 1, on which date an advance of one point, or \$2 a ton, was made, making the minimum price on  $\frac{3}{4}$  to 6-in. steel pipe 80 and 5 off list to the largest trade. No other changes were made in prices, but at the close of the year the National Tube Company, La Belle Iron Works, Youngstown Sheet & Tube Company, and in fact all the prominent pipe mills, issued a new list of discounts designed to do away with some inequalities in the former list, and which went into effect on January 1.

In the last half of the year the demand for tubular goods of all kinds was heavy, and the mills had all the business they could handle. Indications point to a large trade in tubular goods during 1910, and the year is expected to be a record breaker in tonnage, especially on the larger sizes of pipe, a great many projects for oil and gas lines being under way, which, in all probability, will be put through.

#### IRON AND STEEL SCRAP.

The first six months of 1909 in the scrap trade were very lean, but in the last half of the year this trade showed considerable betterment, the demand being unusually heavy for steel making scrap, and prices showed a material advance over the first half.

The low point in prices of heavy steel scrap was reached in March and early April, at which time it

sold at \$13.75, delivered to leading consuming points. Other grades of scrap were proportionately low in price, borings selling as low as \$7 in these two months. Commencing with May there was a gradual recovery in prices, and also in demand from consumers. In the last four months of the year the demand was very heavy, and prices reached a high point. Early in December heavy steel scrap sold as high as \$18.25, delivered to consuming points, and was very scarce.

To show fluctuations in prices of scrap during 1909 we give below a table of monthly average prices of heavy steel scrap, bundled sheet scrap, cast iron bor-

ings and No. 1 cast scrap, per gross ton, f.o.b. Pittsburgh:

Month.	Heavy steel scrap.	Bundled sheet scrap.	Cast iron borings.	No 1 cast scrap.
January	\$16.56	\$14.12	\$10.37	\$14.75
February	15.50	13.06	9.12	14.06
March	14.19	11.31	7.94	13.50
April	14.00	10.80	7.50	13.35
May	15.06	11.25	8.56	14.25
June	15.75	13.04	9.69	14.56
July	15.85	14.34	9.70	14.95
August	16.31	14.87	9.88	15.37
September	17.45	15.35	10.95	16.30
October	17.94	16.25	11.44	17.12
November	17.56	14.62	10.75	17.12
December	17.75	16.15	10.50	16.45

## THE CHICAGO IRON TRADE IN 1909.

BY R. L. ARDREY.

At the beginning of the year 1909 the iron and steel industry in Chicago was at the lowest ebb of production that had been known in recent years, and perhaps the lowest, relative to capacity and general conditions, that has ever been known since Chicago became an important center in this line. In both sales and mill production the record for December, 1908, and January and February, 1909, was far below the average for 1908. At the beginning of 1908 the mills had large contracts which had been taken before the panic of 1907, for delivery in 1908, representing a considerable tonnage of rails, bars and other products. These contracts, with the addition of new business taken in 1908 for prompt shipment, had kept the mills going and made perhaps a better average of mill production for the Chicago District than for the entire country. If the Chicago mills had been dependent during 1908 on the sales made in that year, the business done would have represented less than one-third of their capacity, and at the close of the year the trade had gone to the lowest stage.

### **The Year Opened with Limited Business.**

On January 1, 1909, the contracts in hand represented only a nominal tonnage, and new business was almost incredibly light in January and February. Buyers could get very prompt shipment on small orders and manufacturers, jobbers and other customers of the mills followed rigidly the policy of buying from hand to mouth. The railroads, which normally take more than half the product of this district, were buying practically nothing. In every direction the consumption of steel seemed to have been reduced to the vanishing point, and there were many old observers in the trade who doubted whether prosperity would ever come again. The mills had been unable to make any reduction in cost of production in the year following the panic; wages had not been reduced, and the only contemplated change in freight rates was an advance. Overhead costs were relatively higher because figured against the smaller production, and working costs were also higher in handling short orders.

On the face of things there seemed to be no reason for any radical reduction in prices and the argument was put forth that even if steel were sold at a loss it would not stimulate new buying. But back of all these discouraging features was the undeniable fact that underlying business conditions were really sound. Agriculture has always been regarded as the foundation upon which rests industrial prosperity in the Mississippi Valley, and the farmers had enjoyed good crops, good prices and were generally more prosperous than at any period in the history of the United States. Railroad traffic was good, and had been exceeded only in one or two years. Building was fairly active through the West. In Chicago the year 1908 had broken all records in the cost of new buildings erected. The

iron and steel industry had been left far behind in the general recovery from the panic of 1907.

This condition continued through January, February and March, 1909. In the latter part of February the great breakdown in prices of steel products occurred, but for a month after this event it looked as though the pessimists had been right in declaring that such a reduction would not revive activity in the industry. When the reduced prices were announced the hand-to-mouth buyers increased their orders slightly, but not enough to bring the mills up to half their capacity, and business dragged along through April with the mills taking small contracts which often represented a definite loss. Pig iron reached the lowest price and the dullest period of the year in March, and scrap, the most sensitive barometer of the trade, also reached its low level for the year during that month, when values went below the average for 1908.

### **The Revival Began Late in April.**

Toward the end of April there were indications of an old-fashioned revival. A large tonnage of pig iron was sold for delivery through the second half of the year, and buyers of steel also began making contracts for deferred delivery.

The revival in steel did not come until May. In that month the Illinois Steel Company took contracts amounting to more than 300,000 tons of rolled steel products, and each month thereafter showed an increase until October. Other mills operating in this district or represented here obtained their share, and the transition from the lowest ebb of depression to the high tide of prosperity has been almost as remarkable as the paralysis of the industry which marked the beginning of 1909. There was a great deal of buying in advance of requirements during the first two or three months of this period. The low prices made on soft steel bars, in some cases below 1.30c., Chicago, on large contracts, brought the implement manufacturers and other large purchasers into the market with contracts for all they could get; and in the case of implement bars contracts were made for a year's requirements, dating from July.

The heavy buying by jobbers during this period could hardly be considered as speculative, as the country was bare of stocks, and this trade furnished a considerable quota of the odds and ends of steel orders to fill up the mills. The most important factor in the revival, however, was the return of the railroads to normal purchases of rails, track supplies and carshop material. The sales of rails during 1909 for Chicago mills broke all records, and nearly half of the business taken was for shipment during 1909, leaving about 800,000 tons under contract for delivery during 1910 from the South Works and Gary mills of the Illinois Steel Company. Angle bars, track bolts, spikes and other track supplies were bought by the railroads on

a corresponding scale, and the plate mills in this district were at the close of the year overcrowded with orders growing out of contracts for steel cars.

#### The Course of Prices.

In standard rails there has been no change in prices, but the increased cost of production and the more exacting specifications of the railroads have really been equivalent to a reduction. When the general reduction of prices in other rolled steel products took effect in February it was thought that Chicago would become a basing point independent of Pittsburgh, and in fact a differential of a \$1 or more a ton was for a time maintained. After the revival in May the demand from the West overreached the capacity of Chicago mills and thus Pittsburgh prices again became the ruling factor in the trade. Later, bar prices were quoted below the Pittsburgh base plus freight, but even in this line the Chicago market was unable to maintain its independence and at the close of the year steel bars and practically all rolled steel products followed Pittsburgh quotations. In 1910, with the Gary merchant mills in operation, this market may become independent of Eastern conditions.

The lowest prices made by Chicago mills on contracts taken at the beginning of the revival in March and April were 1.28c. on bars and 1.38c. on structural shapes and plates. From this point there was a gradual advance during the summer months and at the close of the year prices were 40 and 50 cents per 100 lb. higher. There was no definite advance on specific dates, as the mills had no agreements or understandings. Usually the mills that were most congested led the way by asking 10 cents higher, and after several weeks others fell in line, the buyers having compelled these steps by forcing contracts on the mills in excess of their capacity. At the close of the year the leading interest quoted 1.68c. on bars, but could only take business for deferred shipment, and buyers who wanted prompt or earlier delivery had to go to other mills which were not sold so far ahead and pay 1.78c. The same condition held true on structural shapes and plates, the leading interest being sold so far ahead at 1.78c. base, that buyers for nearby delivery paid 1.88c.

Steel bars at 1.78c. in December were 20 cents per 100 lb. higher than the ruling price in 1908, and equal to the high price in 1907. Leading consumers were bitter in their complaints during the summer and fall of 1908 against the price of 1.58c. which they were then paying, but at the close of 1909 no objection was made to paying any price that would bring the desired delivery, and jobbers were doing an unusually large business in selling material from store at 2c. base to buyers who would ordinarily get their materials direct from the mills.

In bar iron the Chicago District gave emphatic evidence in the past year of its independence of Pittsburgh. At the beginning of the year the price was nominally 1.50c., but was reduced concurrently with the break in steel prices, reaching about 1.25c. as the lowest inside price in April and May. From this level the price gradually advanced with the growth in demand, reaching 1.60c. Chicago, in December. The bar iron mills were not overwhelmed like the steel mills with a rush of buying during the summer, and did not approach full capacity in their operations until September. At the close of the year they were able to promise deliveries within a few weeks from the date of specifications, although they had a comfortable tonnage of contracts booked for the first quarter of 1910.

#### Pig Iron.

At the beginning of the year the pig iron market in both Northern and Southern grades shared the general stagnation that prevailed in every branch of the industry, with \$17.26 quoted as the average price

of Northern coke No. 2 for January, and \$17.35 as the average for the same month for Southern coke No. 2. The demand was so light that the price of both Northern and Southern declined in February and March. In March, April, May and June Northern iron remained steady at \$16.50. Southern No. 2 foundry declined to \$11, Birmingham, in April, or \$15.35 Chicago, but a buying movement at the end of April and early in May carried the price up to \$11.50. Most of this buying was for second quarter and last half. In July a further increase in the demand carried the price upward, and in August, September and October the sales of Southern iron by Chicago houses were the largest they had ever done, these sales covering deliveries for the balance of the year and later for the first quarter and first half of 1910. This movement carried prices in October to \$15, Birmingham, or \$19.35 Chicago. Early in November, however, the market in Southern grades began to weaken through offerings of warrant iron owned by speculators and stored at Southern furnace yards. In December this weakness grew into more or less demoralization through the efforts of brokers who scalped the market by taking iron from foundries that had overbought and reselling it, the price receding under this scalping operation to \$14, Birmingham. In Northern iron, however, consumption and production remained so evenly balanced that the market stood firm to the end of the year, holding an advance to \$19.50 Chicago, which it reached in September. The demand for malleable Bessemer has continued particularly good and high silicon irons are also strong. Lake Superior charcoal shows the remarkable record of a uniform price from the beginning to the end of the year.

#### Scrap.

The year began with a declining market in scrap. In the fall of 1908 there had been an advance in old material culminating just before the election, but in November and December there was a gradual softening in the market, due to the fact that the supply was in excess of the consumptive demand in practically all grades. This recession in prices continued until March, when the demand improved. During the next six months there was a more or less steady advance, rising to the highest level in September. The improvement in the demand during the spring and summer months did not for a time bring out large offerings as the sales by railroads were less during the summer months and country dealers as well as the large yard dealers in Chicago, were reluctant to part with their stocks.

The high prices reached in September started the largest movement in scrap that has ever been known in the history of the Chicago market, amounting, it is estimated, to 100,000 tons a month. This flood carried values down, especially in wrought grades. The open hearth steel interests, including the Gary plant, absorbed readily all the steel scrap, taking not only all the strictly heavy melting steel that came into the market, but also shoveling steel, No. 2 wrought, heavy busheling scrap, and other material which can be used in open hearth furnaces. This demand held prices fairly steady for the steel grades, but an over supply of wrought scrap made the break in values more pronounced in those grades. The market steadied in December and showed but little fluctuation to the end of the year.

Old steel rails for rerolling into bars have become a very active factor of the Chicago market. There are now four mills in this district rolling bars from this material, at the rate of perhaps 10,000 tons per month. Old iron rails, however, become a less important element in the market each year, and the supply is growing less.

The following are tables showing the course of prices monthly in 1909, and yearly averages for 10 preceding years, on leading iron and steel products:

## Average Chicago Prices of Pig Iron, 1909.

Month.	Northern coke No. 2.	Superior charcoal.	Southern coke No. 2.
January	\$17.26	\$19.50	\$17.35
February	16.75	19.50	17.10
March	16.50	19.50	16.23
April	16.50	19.50	15.55
May	16.50	19.50	15.85
June	16.50	19.50	15.85
July	16.90	19.50	16.98
August	17.13	19.50	17.47
September	18.70	19.50	18.25
October	19.00	19.50	19.35
November	19.00	19.50	19.22
December	19.06	19.50	18.35
Average for year.	\$17.50	\$19.50	\$17.30
Average for 1908	17.26	20.24	16.76
Average for 1907	24.18	26.56	24.47
Average for 1906	20.15	20.72	19.44
Average for 1905	17.30	17.99	16.66
Average for 1904	14.04	15.50	13.92
Average for 1903	18.88	22.13	18.31
Average for 1902	20.50	23.50	20.10
Average for 1901	15.00	17.50	14.60
Average for 1900	19.12	22.00	18.35
Average for 1899	17.65	19.80	17.75

## Average Chicago Base Prices of Finished Iron and Steel, 1909.

Month.	Common bar iron.	Soft steel bars.	Structural shapes.
	Cents.	Cents.	Cents.
January	1.50	1.58	1.78
February	1.48	1.53	1.71
March	1.38	1.38	1.48
April	1.28	1.34	1.46
May	1.28	1.37	1.36
June	1.33	1.38	1.43
July	1.35	1.45	1.51
August	1.39	1.51	1.58
September	1.46	1.57	1.62
October	1.53	1.58	1.68
November	1.56	1.63	1.73
December	1.60	1.68	1.78
Average for year.	1.43	1.50	1.59
Average for 1908	1.56	1.66	1.82
Average for 1907	1.78	1.77	1.87
Average for 1906	1.71	1.68	1.86
Average for 1905	1.65	1.65	1.78
Average for 1904	1.41	1.50	1.71
Average for 1903	1.65	1.72	1.75
Average for 1902	1.71	1.73	1.75
Average for 1901	1.58	1.58	1.70
Average for 1900	1.75	1.75	2.00
Average for 1899	1.80	1.90	2.00

## Average Chicago Prices of Old Material, 1909.

Month.	No. 1		Heavy Old steel	
	Old iron	railroad	Heavy	melting
	rails.	wrought.	cast scrap.	scrap.
January	Gross ton.	Net ton.	Net ton.	Gross ton. Gr. ton.
January	\$18.81	\$13.81	\$13.06	\$13.94 \$15.81
February	18.25	12.88	12.75	13.56 15.12
March	16.94	11.43	12.19	12.13 13.06
April	16.10	11.90	12.60	12.35 13.20
May	16.63	12.81	13.31	13.44 14.44
June	17.00	13.38	13.81	14.50 15.50
July	17.00	13.16	13.44	14.06 15.40
August	18.38	14.44	14.06	15.00 16.12
September	19.20	15.35	14.75	16.00 17.15
October	20.75	15.94	15.63	16.43 18.00
November	20.62	15.31	15.12	16.00 18.00
December	20.00	14.75	14.75	16.00 18.00
Average for year.	\$18.31	\$13.76	\$13.79	\$14.45 \$15.82
Average for 1908	16.60	12.45	12.69	12.45 .....
Average for 1907	22.47	14.63	17.26	15.08 .....
Average for 1906	23.04	15.62	14.55	14.74 .....
Average for 1905	20.18	16.14	13.50	13.97 .....
Average for 1904	16.56	12.45	10.95	10.72 .....
Average for 1903	20.29	16.07	14.75	15.50 .....
Average for 1902	23.91	19.68	15.03	17.37 .....
Average for 1901	19.50	15.00	11.25	.... .....
Average for 1900	17.90	15.00	11.00	.... .....
Average for 1899	21.00	17.25	12.40	.... .....

## New Construction in 1909.

The past year has been a notable one in the development of the iron and steel industry in the Chicago District. The Gary plant made its first steel in February, and in 11 months worked up to a rate of production over 100,000 tons monthly. In lesser operations

many new enterprises and improvements are to be mentioned.

The Riverdale Iron & Steel Company, which has a bar iron mill located on the Calumet River in Chicago, began operations about a year ago. Its capacity is about 10,000 tons a year.

The Blue Island Car & Equipment Company began rolling bar iron in September at its mills at Blue Island, which are rated at 20,000 tons annual capacity.

The Calumet Steel Company, Chicago, began last year the operation of a bar mill for rolling bars from old steel rails, a branch of the steel industry which is becoming an important factor in this district.

The Illinois Steel Company took an important step in the development of the steel industry by installing the first Heroult electric furnace of large capacity that has been built in the United States. This furnace was completed and began operations in May, 1909, and has been producing electrically refined steel on a successful scale at the rate of about 3000 tons per month, the furnace being of 15 tons capacity. This furnace takes hot metal from the Bessemer converter and refines it to reduce the percentage phosphorus, sulphur and other impurities. Experimental lots of rails have been furnished to leading Western roads, and are being tried out on difficult sections of track. Steel made by this process has also been used experimentally in various finishing departments.

The Gary plant of the Indiana Steel Company, now operated under lease by the Illinois Steel Company, has been making history on so vast a scale that its operations cannot be discussed in detail in this brief review. Ground was broken for this plant March 12, 1906, and for the town of Gary on April 14, 1906. July 23, 1908, the first cargo of iron ore was unloaded. December 21, 1908, the first blast furnace, No. 12, was blown in, followed by No. 11 on December 29, 1908. On January 26, 1909, No. 10 was blown in, on June 11, No. 9; on November 23, No. 8, and on December 4, No. 7. No. 6 is expected to come in in February and No. 5 in March, thus completing the original eight furnaces which have been under construction. The first open hearth steel was made February 2, 1909. The rail mill was started February 17, making rails. The 32 and 24 in. trains of the billet mills were started August 16, and the 18-in. mill October 6. On December 16 the 18-in. merchant mill, the first of five merchant mills, was operated.

In the past year five large companies have definitely decided upon plants to be constructed around the steel works at Gary. These are the American Sheet & Tin Plate Company, American Steel & Wire Company, American Bridge Company, American Car & Foundry Company and the American Locomotive Company.

New construction work now in progress, or for which plans have been made by the Inter-Ocean Steel Company, the Iroquois Iron Company, the Inland Steel Company and others is referred to in another article.

The Federal Furnace Company, Chicago, has let the contract for the immediate construction of a casting machine, which will enable the company to furnish basic and other grades of machine cast pig iron.

**An Electric Steel Foundry at Chattanooga.**—The Southern Steel Casting Company has recently been organized at Chattanooga, Tenn., by Walter Crafts, T. M. Girdler, of the Atlanta Steel Company, and others. The company expects to install an electric steel furnace of either the Heroult or Girod type for the production of high grade electric steel castings, ranging in size from 1 lb. to several tons. Electric power will be obtained from a large hydro-electric plant now being built on the Tennessee River by the Chattanooga & Tennessee River Power Company.

## THE PHILADELPHIA IRON TRADE IN 1909.

BY AUGUST A. MILLER.

The wonderful recuperative powers of the country were, in all probability, never so aptly illustrated as they have been by the movement in the iron and steel trade in the past year. From conditions in the early months which bordered almost on the chaotic to extreme activity in the last half, with record breaking productions in many lines, was going almost from one extreme to the other. The problems which the trade encountered at times appeared insurmountable. Extreme conservatism, not only during the dull periods but also during the active ones, was necessary to keep the market on a safe basis.

### General Conditions.

We entered the year with a fair amount of confidence, but developments were disappointingly slow. The railroads, the principal market of the iron and steel trades, failed to respond, and general conditions became more and more unsatisfactory. The probable outcome of tariff legislation was a restraining factor to any decided forward movement, particularly as it was evident that there would be sharp reductions in the rates of duty on iron and steel products all along the line.

Before the year had greatly advanced the question of a radical reduction in prices of finished materials was being seriously considered, and it was generally believed that they would be adjusted to meet the proposed tariff legislation. Late in February, however, the leading interest threw the trade in confusion by its announced determination of disregarding the former policy of maintaining prices of all finished materials, except steel rails, the consequence being a wide open market. Reductions were sharp and were generally met by independent interests, but the trade held off for a time, as was naturally to be expected, until the market had found its level, at which business was heavily placed, in many cases for extended forward shipment. In order to meet the lowered selling prices the strictest economy was, from necessity, practiced. Operating expenses were reduced to the minimum, sharp curtailments in production were made and during the spring months there was a general lowering of wages, averaging about 10 per cent.

### Tariff Revision.

Tariff revision discussion affected the trade to a considerable extent in the first half of the year. From the nature of the evidence before the Ways and Means Committee it was clear that a sharp revision downward would be made, and considerable diversity of opinion prevailed as to the effect such reductions would have on the trade. Lower rates would naturally reduce the point, as compared with the previous duty, at which foreign material could be imported, and thus have a tendency to hold domestic prices below that level, except when the natural demand exceeded the supply.

The cut in the iron ore duty from 40 cents to 15 cents a ton stimulated importation. In 11 months of the present year over 1,000,000 tons were imported at the port of Philadelphia, and it is believed that the total for the year will exceed 1,100,000 tons, while from the heavy purchases already made for future delivery it looks as if that total would be materially exceeded in 1910.

Notwithstanding the reduction of \$1.50 in the pig iron duty, importations were not heavy, owing largely to the fact that the difference in prices abroad and in this country was not sufficient to enable profitable importation. An aggregate of some 26,000 tons for shipment to this port was purchased during the fall months,

a considerable portion of which is still to arrive, but the movement was of short duration.

The reduction from \$4 to \$1 a ton on scrap material seemed to open the way for increased importations. But the provision that the material so imported be deemed scrap iron or steel if it were fit only to be remanufactured by melting imposed some limit, as under the classification wrought iron scrap for rolling mill purposes was practically excluded from the benefit of the lower rate of duty. Steel scrap was purchased quite extensively by the Eastern steel mills, a considerable tonnage arriving at this port in the later months of the year. By the time the new tariff had become a law, however, the trade had adjusted itself to the new conditions and from mid-year on the forward movement in business was pronounced, although there had been a slow but steady betterment for some months previous to that time.

### The Range of Pig Iron Prices.

The market at the beginning of the year had a comparatively strong appearance. Prices were fairly well maintained, but buying lacked snap, consumers apparently not being willing to take the promised prosperity seriously. In the majority of cases producers were sold up for a few months ahead and made no attempt to force business, to have done which would have undoubtedly meant lower prices. As the year advanced the anticipated betterment in trade conditions failed to develop, and the uncertainty regarding finished materials acted as a drag on the whole market.

Late in February the announcement that prices of finished materials had been cut sharply, and practically an open market declared, had a weakening effect on the iron market. The reductions in prices, however, were not so pronounced as those in the finished lines, as there had been a gradual adjustment of pig iron prices during the previous year, based in a measure on the supply and demand, while those for finished materials had been upheld. Conforming with the declining prices of pig iron, curtailment of production was pronounced, costs of production were pared down, wages reduced about 10 per cent. on the average, and plants were operated on the most economical basis possible. The tariff question also added its share of unfavorable influence on the trade. Continued lack of demand had the usual weakening effect on the market and prices gradually declined, and during April and May reached the low level of the year.

Late in May indications that the tide had turned were apparent. As mid year approached buyers were strongly inclined to place business for extended delivery. Renewed prosperity appeared certain, but sellers who had been getting low prices for their iron were not inclined to load up their books at current rates, and the policy of adding 50 cents a ton, or even more in instances when the tonnage was large or the delivery extended, was pretty generally followed and maintained for some months, until the situation automatically adjusted itself. The accumulated stocks on furnace banks began to be drawn on pretty heavily, and productive capacity was gradually expanded so as to meet the constantly growing demand. Prices showed a gradual upward movement in August, September and October, but in November and December were practically stationary.

Heavy purchases of steel making grades from time to time strengthened the market materially, aiding not only the basic iron situation, but reflecting strength on other less active grades. A heavy buying movement occurred in the early fall, consumers taking care of their requirements for the remainder of the year, then

somewhat later for the first quarter and, in instances, for the first half of next year, prices being practically the same for either prompt or forward shipment. December, under such circumstances, was a rather quiet month.

The relatively high price for the foundry grades during the early fall resulted in a little importation of English pig iron, made possible by the reduced rate of duty, but the business was of an unimportant nature. Two cargoes of Middleborough iron were imported at this port by a leading cast iron pipe interest, while another took over a moderate lot, and several cargoes are yet to arrive.

The following table shows the high and low range of prices for the principal grades for each month of the year, based on deliveries in buyers' yards in eastern Pennsylvania and adjoining territory:

Prices of Pig Iron at Philadelphia in 1909.												
	January.		February.		March.		April.		May.		June.	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.
Pennsylvania No. 2 X foundry...	\$17.25	\$17.50	\$16.75	\$17.50	\$16.25	\$17.00	\$16.00	\$16.50	\$16.00	\$16.50	\$16.25	\$16.75
Virginia, No. 2 X foundry.....	17.25	17.75	17.25	17.50	16.75	17.25	16.50	17.00	16.50	16.75	16.50	17.00
Standard gray forge.....	16.00	16.50	16.00	16.50	15.00	16.00	14.75	15.25	14.75	15.25	15.00	15.50
Basic .....	16.75	17.00	16.00	17.00	15.00	16.00	15.00	15.25	15.00	15.50	15.50	15.50
Low phosphorus.....	21.50	21.75	21.50	21.75	21.00	21.50	20.00	21.00	19.50	20.00	19.50	20.00
	July.		August.		September.		October.		November.		December.	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.
Pennsylvania No. 2 X foundry...	\$16.50	\$17.00	\$16.75	\$18.00	\$17.75	\$19.00	\$18.50	\$19.50	\$19.00	\$19.50	\$19.00	\$19.50
Virginia No 2 X foundry.....	16.50	17.00	16.75	18.00	17.75	19.00	18.50	19.50	19.00	19.50	19.00	19.25
Standard gray forge.....	15.25	15.75	15.75	16.75	16.50	17.50	17.50	17.75	17.75	18.25	17.75	18.25
Basic .....	15.50	16.75	16.50	18.00	18.00	18.50	18.00	19.00	18.50	19.00	18.75	18.75
Low phosphorus.....	19.50	20.00	20.00	21.00	21.00	22.50	22.00	22.50	22.75	23.25	22.75	23.25

#### Pig Iron Stocks.

In the absence of any general data showing stocks of iron on the furnace yards, it is somewhat difficult to arrive at a satisfactory conclusion regarding the statistical position in the pig iron situation. As far as the Eastern merchant furnaces are concerned, stocks on hand have, for the greater part of the year, been so small that they might almost be considered nil. From mid year on melters have been taking deliveries freely in many cases anticipating regular shipments, so that producers have been unable to pile any surplus iron. Toward the end of the year the supply apparently caught up, to a large extent, with the demand, as was to be noted by decreasing pressure for deliveries.

The amount of iron carried in stock by the Eastern Pig Iron Association furnaces increased steadily until May, during which month they were 65 per cent. greater than at the first of the year. From June on there was a decrease, at times quite sharp, and by December 1 the accumulation had been cut in half, and in that month showed a lower total than that on hand at the beginning of the year, representing less than a week's supply at the full active capacity then in blast.

Statistics of the Virginia Pig Iron Association show that there was a steady increase in stocks carried by the furnaces during the first nine months of the year, the leading producer accumulating a particularly heavy tonnage. The highest point was reached in September, and was followed by a steady decrease, total stocks being reduced about 10 per cent. at the close of the year.

#### Ferromanganese.

Early in the year 80 per cent. ferromanganese sold for first half delivery at \$44 to \$45, Baltimore, but the market gradually declined owing to the weakening demand, \$40 to \$40.50 being freely done in May for prompt, and \$41 to \$42 for last half shipment. In mid year a slight upward movement in prices developed, \$42 to \$43 prevailing for several months. In August, however, weaker conditions were again noted, the new reduced tariff rates, no doubt, having some influence in lowering quotations, and prices dropped back to \$40 for deliveries during the remainder of the year, although quotations ranged \$2 to \$3 higher for deliveries in the first half of 1910, for which inquiry developed at

that time. Sales for first quarter were made early in the fall at \$41. Toward the end of the year, however, prices again developed a little more strength and there was a gradual advance for first half deliveries, prices ranging from \$43 to \$44, with moderate sales for the last half shipment at \$44.75.

The actual range of prices throughout the year was within \$5 a ton, but would probably have been greater had not the import duty in mid year been lowered from \$4 to \$2.50 a ton. No direct reduction in prices followed the enactment of the new tariff law, but the lowered rate of duty, no doubt, acted as a check in any material price advance.

#### Steel Billets.

In the opening month of the year business was dull. The maintained basis of prices, \$26.20 delivered in this

territory for ordinary rolling steel; failed to interest consumers. Late in February the market was entirely upset by the sharp price reductions. Quotations in the West went to a lower level than those named by Eastern makers, the lowest open quotation named for ordinary open hearth rolling billets being \$24.20, delivered in this territory, which was reached in May.

The demand during the second half of the year showed a steady and at times a very marked betterment. About the middle of September the supply of billets in the West became scarce and consumers there came into the Eastern market, placing considerable tonnages at prices ranging from \$27 to \$28, Eastern mill. The market early in October gradually worked up to \$28, Eastern mill, equal to \$28.60, delivered in this vicinity, for shipment during the balance of the year, makers at this time steadily refusing to open order books for early 1910 deliveries. In November, however, business was taken in a conservative way for first quarter shipment, prices having in the meantime moved up to \$30, Eastern mill, or \$30.60, delivered in this territory. Late in the year prompt billets were scarce and commanded a premium.

Forging billets followed the same general course as rolling billets during the greater portion of the year, prices averaging \$2 to \$3 advance over ordinary billets, dependent on the composition. During the fall months, however, an extraordinary demand developed from Western consumers, producers there being fully sold up and unable to make deliveries. Prices advanced sharply owing to the increased demand and at the close of the year forging billets were quoted at \$32 to \$34, Eastern mill, dependent on composition.

#### Plates.

With the announcement of the open market in February prices fell off sharply. A general withholding of business followed, consumers adopting a waiting policy until the market should apparently reach actual bottom. Eastern mills did not openly reduce quotations below 1.45 cents, delivered here, although that price was probably shaded for desirable business. Mills in other districts, however, went a full tenth lower at times and business which had heretofore been

coming to Eastern mills went to Western makers at the lower quotations.

Beginning with the early summer, there was a gradual betterment. About the middle of June a decided hardening of prices was noted, mills were operating on about a 75 to 80 per cent. basis and the demand from the railroads, bridge builders, shipyards and general consumers became more pronounced. In August producers were again operating plants at practically normal capacity, as far as finishing departments were concerned, and in some few cases record productions were made. A gradual uplifting of prices continued during September and October, although it was early November before there was any real uniformity in quotations, the then prevailing price for deliveries over the balance of 1909 being 1.75 to 1.80 cents, delivered. Toward the close of the year mills showed less anxiety to book orders, specifications were coming in freely, makers endeavoring to absorb all the material due them on low priced contracts which would expire with the year end.

#### Structural Material.

The demand hesitated early in the year, but after the general reduction of prices was made and a low level practically established, there was a heavy buying movement. Operations held in abeyance while higher prices prevailed were again taken up, and, at times, business placed exceeded all records.

In the early summer, mills began to gradually fill up with work, resulting in an upward movement in prices in July. Conditions continued to improve and prices worked further upward. Delays in deliveries on some sizes and classes of material became pronounced. At the close of the year specifications on unfilled orders were very heavy and mills so fully engaged that they were unable to catch up on delayed shipments.

The extremely active demand during the year resulted in a decision on the part of one large structural mill in this territory, the Eastern Steel Company, Pottsville, Pa., to expand its facilities so as to increase its ingot production nearly 100 per cent., the added capacity to come into operation, it is expected, early in the spring of 1910.

#### Sheets.

As in other lines of rolled products, the demand for sheets was of an unsatisfactory nature in the early portion of the year. With the break in prices in February Eastern mills changed to a considerable extent their method of making quotations, naming prices f.o.b. mill, and eliminating the customary freight differential. They refused, as a rule, to meet the sharp cuts made by Western makers.

Toward mid year the demand for sheets showed a betterment; while business was still largely of a day to day character, orders were heavier, showing increased activity on the part of consumers. September opened with order books in better shape than at any time previously during the year; prompt deliveries were difficult to obtain and commanded premiums, as did also extended orders.

During the closing months Eastern makers had more business offered them than they could readily take care of; prompt deliveries commanded a premium of \$1 to \$2 a ton, while orders were taken for the first quarter of 1910 at ruling quotations, mills closing the year with order books in very satisfactory shape.

The following table shows the various price changes during the year, quotations being f.o.b. mill, except in January, when they represented nearby deliveries:

#### Eastern Mill Prices of Sheets.

Nos.	Nos.	Nos.	No. 27.	No. 28.
18 to 20.	22 to 24.	25 to 26.		
January 1.....	2.50	2.60	2.70	2.80
March 1.....	2.40	2.50	2.60	2.70
September 30....	2.50	2.60	2.70	2.80
November 18....	2.60	2.70	2.80	2.90
November 30....	2.70	2.80	2.90	3.00
December 30....	2.70	2.80	2.90	3.10

#### Bars.

There was no concerted action by Eastern makers in 1909 and quotations at times showed marked irregularity, being governed largely by supply and demand as well as individual conditions at the different mills. During the early portion of the year the demand was extremely weak. Considerable low priced business was carried over from the preceding year by some makers, against which specifications were still coming out, and a declining demand in January resulted in a softening of prices.

With the break in the established prices for all finished materials in the second month of the year refined iron bars fell off to 1.37 cents, delivered here, with mills making a small range of sizes cutting down as low as 1.28 cents, delivered. On the downward movement of prices steel bars were cut to 1.35 cents, delivered, and on sharp competition were reduced to 1.30 cents, delivered, and this price was even understood to have been shaded when competition was sharp. With the lowered prices came sharp curtailments in cost of production, mills were operated at irregular intervals, wages were reduced and every economy practiced to keep the mills in operation, but this was difficult owing to the unsatisfactory demand, which continued to decline. Late in April prices reached the lowest of the year, when the leading producers quoted a range of 1.35 to 1.45 cents, delivered, and smaller concerns 1.25 to 1.35 cents for refined iron bars, delivered in this vicinity.

In May a general betterment in conditions set in. Steel bar makers had loaded up with considerable tonnage and were better employed, prompt deliveries were less easy to obtain and prices showed a firmer tendency. As specifications gradually became heavier on steel bars, consumers again turned their attention to iron bars and endeavored to contract for forward delivery at prevailing prices, but makers refused, as a rule, to accept business of that character.

Early in August the low priced sellers practically withdrew, having taken all the business of that character they wanted, and a steady upward movement in prices was to be noted during the greater portion of the remainder of the year. During October 1.57 to 1.62 cents was named for refined iron bars, with steel bars at 1.65 cents, and makers unable to make deliveries on the general run of sizes in the latter for four to six months ahead. November prices for iron bars moved up to 1.65 to 1.75 cents, dependent on tonnage, delivery and customer, which quotations leading producers maintained at the close of the year.

#### Coke.

The market was decidedly irregular. Early in the year production was greater than consumption and prices gradually declined. Toward mid year the market took on a little better appearance. As the betterment in general conditions became more pronounced quotations moved upward and accumulated stocks began to diminish. The more urgent demand advanced coke makers held prices more firmly, and in September the price of furnace more rapidly than foundry coke.

In October the market settled down somewhat with quotations practically unchanged. In November, however, prices showed a further slight advance, business for first quarter and half of 1910 being done at figures slightly above those prevailing during the previous month. Toward the close of the year irregularity again developed and there was some softening of prices.

The following table shows the monthly low and high range of prices per net ton for delivery in this vicinity, dependent on grade, tonnage and point of destination:

## Prices of Coke at Philadelphia in 1909.

	January.		February.		March.		April.		May.		June.	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.
Connellsville furnace.	\$3.85	\$4.10	\$3.75	\$4.10	\$3.75	\$3.90	\$3.75	\$3.90	\$3.75	\$4.10	\$3.90	\$4.10
Connellsville foundry.	4.25	4.50	4.25	4.50	4.10	4.50	4.10	4.40	4.10	4.40	4.35	4.50
Mountain furnace.	3.45	3.70	3.45	3.70	3.35	3.50	3.35	3.50	3.35	3.70	3.50	3.70
Mountain foundry.	3.80	4.10	3.85	4.10	3.75	4.10	3.75	4.00	3.70	4.10	3.80	4.10
	July.		August.		September.		October.		November.		December.	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.
Connellsville furnace.	\$3.90	\$4.10	\$3.90	\$4.10	\$4.15	\$4.75	\$4.95	\$5.25	\$5.00	\$5.50	\$5.00	\$5.25
Connellsville foundry.	4.35	4.50	4.35	4.50	4.50	5.00	5.10	5.25	5.10	5.75	5.40	5.75
Mountain furnace.	3.50	3.70	3.50	3.70	3.75	4.35	4.55	4.85	4.80	5.10	4.55	4.85
Mountain foundry.	3.80	4.10	3.80	4.10	4.10	4.60	4.70	4.85	4.70	5.00	4.85	5.25

## Old Material.

Interest throughout the year centered in the heavy melting steel scrap situation; at times, however, pronounced movements in other grades were noted, due largely to conditions governing supply and demand.

Early in the year the market was decidedly weak in nearly all grades. Consumers did not experience the anticipated betterment in conditions, and prices for No. 1 heavy melting steel sagged steadily from \$18, delivered, the top of the market about January 1, to \$13, delivered, the minimum price of the year, about the middle of April. Choice No. 1 railroad wrought declined during the same period from \$20.50 to \$14, delivered; machinery cast from \$16.50 to \$14; wrought iron pipe from \$15.75 to \$13; wrought turnings from \$14.50 to \$9.75, and cast borings from \$13.50 to \$8, the other grades showing approximately the same proportionate declines.

Following the reduction of prices for finished materials, in February, the market was for several weeks at a complete standstill, and not until May, when general conditions began to improve, did the old material market show an upward tendency. With assured prosperity ahead, buying became active and sharp advances occurred in practically all grades, heavy melting steel going to \$15.75, delivered. In June, July and the early part of August the market was on a fairly even basis with an upward tendency in some grades.

In August a new method of buying old material requirements was adopted by the majority of the Eastern steel mills, by which purchases for the associated mills were made through one merchant, located in this city. Materials bought by this arrangement would be apportioned to the various mills as required, so that shortages or heavy stocks of materials at any one or more mills would not affect market prices to the same extent as they had done heretofore. Fixed prices were

outside mills and merchants frequently paying higher prices than did the associated mills.

In August the price fixed for heavy melting steel was \$17, delivered, but as this failed to bring out any considerable tonnage the offering price was raised during the latter part of September to \$18, delivered. A better demand early in that month lifted prices generally, choice No. 1 railroad wrought going to \$20, machinery cast to \$17.50, wrought turnings \$14.50 and cast borings \$12.50, delivered. Favored by the reduced rate of duty, heavy purchases of foreign scrap began to be made about this time, and in October arrivals of imported material began to come in and continued large throughout the remainder of the year, the aggregate tonnage of foreign scrap to arrive between August and late in December being 28,291 tons. Considerable scrap also arrived from the Pacific Coast as well as from Southern ports.

Toward the close of the year the supply of old materials used by the steel mills became greater than the demand, large arrivals of foreign material as well as supplies received from distant points filled up the mills, and what was practically a reduction in prices was announced by the associated mills early in December, this being in the nature of an allowance on purchases equal to the freight rate to the most distant mill, the buyer using his own discretion as to the ultimate delivery point of the material. Before such an arrangement could be tried out, however, a general reduction was announced, the offering price for heavy melting steel being cut to \$17, delivered, although outside mills paid somewhat higher prices for that grade of material during the closing weeks of the year.

The range of quotations, showing the lowest and highest prices per gross ton of the leading grades of old materials, delivered in buyers' yards, eastern Pennsylvania and nearby points, during each month of the year was as follows:

## Prices of Old Material at Philadelphia in 1909.

	January.		February.		March.		April.		May.		June.	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.
No. 1 steel and crops.	\$16.50	\$18.00	\$15.50	\$16.25	\$13.50	\$14.50	\$13.00	\$14.00	\$13.75	\$15.75	\$15.50	\$16.50
Low phosphorus.	20.00	21.00	19.50	20.50	17.00	18.00	17.00	18.00	17.00	20.00	19.50	20.50
Old iron rails.	19.50	21.75	19.00	20.00	17.00	18.00	17.00	17.50	17.00	19.00	18.50	20.50
Old car wheels.	16.00	17.00	15.50	16.00	14.00	15.00	14.00	15.00	14.50	15.50	15.00	15.50
Choice No. 1 R. R. wrought.	18.50	20.50	17.50	18.75	15.00	16.00	15.00	16.50	16.25	18.25	18.00	19.00
Machinery cast.	15.50	16.50	15.00	15.50	14.00	14.50	14.00	15.00	14.50	15.50	15.00	15.50
Railroad malleable.	15.75	16.25	15.00	15.50	12.75	14.00	12.50	13.75	13.25	15.50	14.00	14.50
Wrought iron pipe.	15.25	15.75	15.00	15.50	13.00	14.50	13.00	14.25	14.00	15.75	15.50	16.00
Wrought turnings.	13.00	14.50	11.50	13.00	9.50	11.25	9.75	11.00	10.50	13.00	12.50	13.00
Stove plate.	13.75	14.25	12.25	13.00	11.00	11.75	11.25	12.25	11.75	12.50	11.75	13.00
Cast borings.	12.00	13.50	10.50	12.00	8.00	9.50	8.00	9.50	9.00	11.00	10.50	13.00
	July.		August.		September.		October.		November.		December.	
	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.	Low.	High.
No. 1 steel and crops.	\$16.00	\$16.50	\$16.50	\$17.50	\$17.25	\$18.25	\$18.00	\$18.50	\$18.00	\$18.25	\$17.00	\$18.00
Low phosphorus.	20.00	20.50	20.00	21.00	20.50	22.00	22.00	22.50	22.00	23.50	23.00	23.50
Old iron rails.	19.50	20.50	19.50	20.50	20.00	21.50	21.00	22.00	21.00	22.00	20.50	22.00
Old car wheels.	14.75	15.50	15.00	16.50	16.50	17.50	17.50	18.00	17.50	18.00	17.50	18.00
Choice No. 1 R. R. wrought.	17.25	18.00	18.00	20.00	19.75	21.00	20.50	22.00	20.00	21.50	19.50	20.00
Machinery cast.	14.75	15.25	15.00	16.00	15.50	17.50	16.75	18.00	17.50	18.00	17.50	18.00
Railroad malleable.	14.50	15.00	14.50	16.00	15.00	18.00	17.00	18.00	17.00	18.00	17.50	18.00
Wrought iron pipe.	15.50	16.00	16.00	17.25	17.00	18.00	17.25	18.00	17.00	17.75	16.00	17.00
Wrought turnings.	12.25	13.00	13.00	14.50	14.25	16.25	15.00	16.25	14.50	16.00	14.25	14.75
Stove plate.	12.50	13.00	12.50	13.50	13.00	14.50	14.00	15.00	14.00	15.00	13.25	15.00
Cast borings.	10.00	11.00	11.00	12.25	12.50	13.50	13.00	14.00	13.00	14.00	12.00	13.00

named at which the mills would make purchases, heavy melting steel being taken as a basis. Some confusion followed the adoption of the plan, particularly as far as unassociated mills and merchants were concerned, the

## The Outlook for 1910.

An entirely different brand of prospective prosperity than that which prevailed at the opening of 1909 is to be noted. Decidedly better conditions were then

anticipated, but the market lacked the substantial undertone necessary for actual betterment. That 1910 is to be a banner year is the view generally expressed in all branches of the iron and steel trades, and opinions are largely substantiated by comfortably filled order books for business extending well into the first half of the year, and more to be had for delivery even beyond that period if producers were willing to accept such orders.

Pig iron production, which is now apparently close to the rate of consumption, may not increase much in 1910 above the present monthly rate, but the market in this territory is strong statistically, owing to the

small amount of stocks carried by the producers. Several additional furnaces will come in early in the year, but it must be remembered that many of those now in blast have been operating for considerable periods and will likely have to go out for extended repairs. In the finished and semifinished material lines conditions are extremely favorable; not only are the mills well supplied with business, but there is still a large volume of prospective work, and few consumers have purchased largely for anything beyond near future requirements, while their more extended needs promise to be greater than ever.

## THE CINCINNATI IRON TRADE IN 1909.

BY H. E. HALL.

In the way of contrasts, December, 1908, and December, 1909, furnished striking examples to those who follow the fortunes of pig iron, and the trend of the trade in steel and manufactured products therefrom. In none of the iron markets of the world have these things been more interestingly apparent than in that of Cincinnati. To illustrate this point perhaps no example could be more appropriately cited than the percentage figures compiled under the direction of the officers of the Cincinnati Metal Trades Association, showing the condition of output in the machinery markets on the dates December 15, 1908, and the same period of 1909. Estimating from June, 1907, as representing the high point of production and output, 100 per cent., the figures for December, 1908, were 56 per cent., and those for December, 1909, 83 per cent. So while one year ago business in the machinery lines which influence all the trades employing iron and steel, from the foundry melt for castings to the railroad cars which carry it, was but a little better than half normal, to-day it is nearly so. To further emphasize and corroborate this statement and these figures, the statements of some prominent men in the iron trade are significant.

### Opinions of Prominent Pig Iron Merchants.

Quoting James A. Green of Matthew Addy & Co.: "1909 is going out with furnace order books well filled, furnaces running practically to their capacity, and with the prospects for next year exceedingly good. At this time in 1908 the exact contrary was the case; the furnaces had no business, the foundries were mainly idle and the future was as dark as could be. It seems to us that trade is on such a broad basis that there will be a demand for every ton of pig iron which the country can possibly make."

D. B. Meacham of Rogers, Brown & Co.: "The condition of the pig iron market at the close of 1909 seems very much more favorable for a continuance of heavy consumption than it did one year ago. The activity of the car works and malleable and steel foundries, occasioned by the heavy buying of the railroads, supplies the needed element that was missing in January last. The enormous consumption of pig iron indicates that a buying movement must take place some time during the first quarter."

President John Sargeant of the Domhoff & Joyce Company: "Our business during the present year and especially during the last half has been very satisfactory, the total for the year being about 25 per cent. greater than that of 1908. We have considerably more orders on our books now than we did a year ago. The consumption is going along at a very rapid gait; and all indications point to the greatest output and sale for the year 1910 in the history of the business. It is difficult to estimate just at this time how soon the next buying movement will materialize; but if consumption continues at the present rate we see no reason why there

should not be a healthy buying, beginning shortly after the first of the year, when prices should sharply react."

Frank M. Eaton, resident partner of Hickman, William & Co.: "The outlook is in my opinion good. There is a strong undertone to the market and a buying movement suggested within 30 days at the least. The furnaces are feeling strong on the situation and there are a number of large buyers who would take hold at once if concessions were made them. In my opinion there are a number of these who were thought to be covered who are really not, and some of these are even now figuring on good sized tonnages for March delivery. The year—the latter part of it—has been very satisfactory to the selling agencies; the steady and substantial buying movement that set in about June 1 has been the natural consequence of a constantly increasing melt, and in my opinion will go on through the new year in a healthy, normal way."

### Consumers' Yards Stocked with Iron at Opening of Year.

The birth of the year 1909 found, for the most part, consumers' yards in all parts of the country well stocked through heavy buying of November, 1908, for first quarter and half, and it was under those conditions that producer and consumer entered the new year.

The pipe makers were all aggressive in the early January markets, and the scarcity of low grades at this particular time brought about the expected result: No. 4 foundry and forge immediately became relatively stronger than No. 2 foundry, and with practically no variations continued so through the entire year. In the South climatic and other contributing conditions favored the make of higher grades, and comparatively little No. 4 foundry and forge and mottled was made. Calculations made by visiting iron men estimated the amount of iron on southern Ohio yards the close of January at about 75,000 tons.

Not less interesting than the memorable opening and closing of 1908 is the record for 1909. It is also a study in contrasts. From the table below it will be observed that No. 2 Northern foundry accomplished more in a price way than Southern; as the former opened at \$13 and closed just \$1 higher; although during the late year it attained a \$1.50 rise, equal to that which marked the finish of No. 2 Northern foundry, whose figures are relatively \$15.50 and \$17. The story of No. 4 foundry and forge is also well told in the table, forge gaining \$2 per ton in the twelve months. The figures are as follows:

	F.o.b. Birmingham.	F.o.b. Ohio furnace.		
	*January.	†December.	*January.	†Dec.
No. 1 foundry.....	\$13.50	\$14.50	\$16.00	\$17.50
No. 2 foundry.....	13.00	14.00	15.50	17.00
No. 3 foundry.....	12.50	13.50	15.00	16.50
No. 4 foundry.....	12.00	13.25	...	...
Gray forge.....	11.50	13.50	...	...

\*First week in January. †Last week in December.

Conservative iron men are disposed to argue that these figures tell the story for 1910—the outline of a healthy market which has not been allowed to run away during the feverish times of November and early December, and consequently, with the certain evidences of increasing consumption a market that will show a steadily increasing pace for the ensuing months.

January, 1909, closed with a volume of sales considerably short of December, 1908, but with Southern ironmasters very independent. Speculative iron disturbed the market and the Valley producers very very aggressive, some large sales being reported at shaded prices. On February 1 the old freight rate of \$1.20 from the Hanging Rock District into this market was restored and for a week or so prior to this some business was closed up on the \$1.10 freight base. Consumers at this time were buying only for actual needs and much Southern resale iron was hawked about at \$12.75, Birmingham, and some was sold at \$12.50. Late in February the open market in finished lines was declared and the Southern furnacemen weakened and evidenced a disposition to meet the consumer half way. Resale iron in the meantime touched \$12, and inquiries began to develop for last half iron, but furnaces were not disposed to open books for this period.

#### Business Eagerly Sought in the Spring Months.

March came in with the market very dull and the feeling that prices were to go lower. All business was closely contested, and the wise ones began to predict a restriction of the output as a means toward settling prices. Agencies had men in the South investigating stocks on furnace yards. They found very heavy stocks and advised blowing out. Uncertainty about the tariff caused more disturbance. The largest pipe interest determined that this is a good time to close up some deals for future deliveries and bought 24,000 tons from Southern furnaces for delivery over the succeeding five months. Still waiting on tariff regulation, the largest pipe interest came into the market again and took about 50,000 tons for the San Francisco contract, and the next thing heard was that \$11.50 Birmingham could be done and some off iron was actually sold for \$11 for second quarter. The agricultural manufacturers following the lead of the pipe interests began feeling the market for large tonnages and secured some bargains.

April 1 found a change of tactics on the part of the Southern furnacemen and they began to go actively after business, asking \$12 for No. 2 for second quarter; Northern furnaces asking for this period \$14.50 to \$15 Ironton. A few furnaces arranged to blow out. It was believed that the bottom had been reached. Southern furnaces began to force things, with the Northern producers playing a waiting game. It was estimated that there were at this time only 80,000 tons of unsold iron on Alabama yards, including basic. Pipe makers in all parts of the country were negotiating for heavy tonnages. Under better producing conditions and increasing consumption opportunities for \$11 iron (which point it had reached under the incessant hammering of the pipe and agricultural interests) began to diminish. Northern producers began at this time to go after business aggressively. The larger Southern interests required all business submitted. Toward the close of April business began to show a slight improvement, although \$11 could still be done on Southern No. 2 for the last half. This period was a profitable one for the agencies; several steelmakers were buying basic, the Massillon pipe works were inquiring for 24,000 tons, the International Harvester people were buying, and the stove makers also began to awaken. There were at this time but five furnaces in the Ohio group making foundry iron. A few Southern ironmasters were accommodating customers with \$11 iron, and \$11.50 was very generally asked for third quarter.

#### The Turn for the Better in May.

The opening of May witnessed the turn for the better in both districts contiguous to this market; \$11.50 was asked and secured for nearby shipment and \$12 was the price for last half on Southern No. 2 while the Northern producers advanced to \$14.50 for the remainder of the year. An immense tonnage of iron was sold under the stimulus of this advance.

The convention of the American Foundrymen and allied interests about the middle of May furnished a strong stimulus to the local markets and there were some good sales made at the \$11 figure for May and June delivery. Statistics at this time showed about 1,300,000 tons on yards in producing districts subject to sale, with the steelmaking irons most active. A slight curtailment of production in the South marked the close of May.

June opened dull with practically no inquiries. There was still some \$11 iron available, but the universal asking price for third quarter was \$11.50 Birmingham, and \$12 was the minimum for last quarter. The Northern furnaces were not making any sign. About June 10 Southern producers settled on a price of \$12 for the last half and some excellent contracts were closed. Consumers began to hurry shipments and ere the close of the month nearly all the Southern group of producers had joined the \$12 column, restricting deliveries at that price to the third quarter. One Ohio furnace advanced its price to \$15.

July opened with a good run of orders and the Southern producers were firm at \$12 flat for No. 2; others withdrawn for third quarter delivery. One Southern interest sold 40,000 tons for delivery over the remainder of the year. At this time there were but three furnaces in the southern Ohio district in blast. The middle of the month developed the first run of inquiries for 1910 iron, but none of the Southern makers showed a disposition to quote. One interest in northern Ohio was willing to name a price of \$16, Ironton, for first quarter. Alabama furnaces at this time were asking \$13 for last quarter. July closed stronger than it opened, with inquiries for 1910 iron accumulating.

August opened strong, with Southern iron firm at \$13 for August and September, \$13.50 asked for fourth quarter alone. One interest ventured a little business at \$13.50 for the first quarter of 1910, but was evidently scared off by his competitors or maturer deliberation, for he withdrew the price and all announced a refusal to quote on 1910 business. Northern producers were less firm and were willing to accept business at \$15.50 for No. 2 for the first quarter. The largest pipe interest at this time stepped in and took a large tonnage. The foundry melt began to increase rapidly. Northern furnaces commenced to withdraw from the market. Inquiries for 1910 iron were accumulating rapidly. At the close of August the Southern ironmaster began to figure on first quarter business, and opened his books at the quoted price of \$14, a tribute to his cleverness in figuring; for that is the spot price of this iron at date, January 1. Some business was negotiated for 1910, however, at this time for \$13.75 as against the \$15.50 asked by the Northern producer.

#### The Fall Months Show a Strong Market.

September opened with an assurance that enough iron had been sold for the new year to establish the \$14 price, and Southern interests began at once to force up the price of spot iron to that figure; the \$13.50 iron gradually disappeared, speculative interests co-operating with the producers. Northern interests advanced to \$16 for the remainder of the year and some asked \$16.50 for the first half, although certain interests maintained the \$16 figure and moved an immense tonnage. The opening week of the month was marked by heavy buying of the foundry interests in Detroit territory and also the largest pipe interest. The \$13.50 iron had disappeared by the middle of the month and the

market was seemingly on a straight \$14 basis for prompt and last quarter. In the meantime \$16, Ironton, was being done for the first half in the southern Ohio field. The last week of the month saw an advance of 50 cents in Southern irons and further withdrawals of furnace interests from the market. Northern producers were asking \$16, Ironton, for No. 2, with 50 cents premium for the first half.

At this juncture the Michigan automobile manufacturers began buying heavily and the month closed with records for both production and sales. All markets were in feverish condition, order books filled to capacity for the remainder of the year and a growing reluctance on the part of producers to name a price for 1910 business. Sales by long distance and wire were features of this period. Steelmaking irons were especially strong; little or no forge was obtainable, and but two furnaces in the Northern districts were willing to sell. The best price obtainable was \$17 for the remainder of the year and \$17.50 for first half. But one furnace interest in Alabama was taking business openly, and this one restricted buyers to a limited tonnage at \$14.50. Some large deals in basic were a feature also.

October came in with the market quiet but strong. There were a few scattering sales of Southern foundry iron at \$15 for first quarter, but the bulk of the business was taken by the Northern interests; most of them selling through the first half at \$16.50, Ironton. The little resale iron out was held to about market levels. Steel making irons were in strongest demand in the middle of the month, and the leading agricultural manufacturing interests began to show willingness to take on 1910 business. A price of \$15 was authorized for the first half on Southern foundry. The close of the month saw forge and low grades the feature, forge reaching its maximum price—\$13.75, Birmingham—at this time. Automobile manufacturers were still buying and by the 28th prices for first quarter and half business were quoted by leading interests. Some sales were made of Southern No. 2 for delivery through the first half and into the third quarter on the basis of \$15, Birmingham.

The first week in November was notable for the sale to an Ohio pipe interest of about 42,000 tons of pipe irons, and it was also at this time that the Hamilton Iron & Steel Company's reorganization occurred. The middle of the month saw pig iron authorities announcing that \$15, Birmingham, would be the price for 1910 Southern iron for the entire year. Two stacks in the Ironton field turned their attention to malleable at this time and Miami Furnace arranged for a casting machine, indicating its intention to put that stack on basic some time during the first quarter.

#### A Lull in November.

The middle of November developed a sudden let-up in buying, but specifications were good; and some speculative iron entered the lists. The published words of a prominent Southern producer at this time, predicting a slump and possibly \$14 iron produced widespread comment and the struggle began to keep price up to the \$14.50 figure. That this was fruitless is shown by subsequent developments, and the ultimatum of furnace interests requiring storage on all iron on yards belonging to customers and not moved by the end of the year did not help matters.

December was ushered in with buyers in a waiting attitude and producers unbending. There was no spot market, and such as there was turned its attention to the 30,000 tons or so of resale iron offered. The December price ball was set rolling by the selling of some spot iron at \$14.50 and \$14, providing for deliveries into January and February. By the second week in December \$14 was being done on prompt iron, but producers insisted on \$14.50 for first quarter. At this time Southern producers figured that the Decem-

ber make would total 180,000 tons, against 176,000 tons in November, and sales of 250,000 tons in January, which was a stimulant for maintenance of the \$14.50 price for first quarter.

Ohio furnaces at this time asked \$17 for first half shipments. The December closing was featured by numerous requests for immediate shipment of iron due later on, which sellers accepted as an excellent sign. Southern iron seemed rather firmly fixed at \$14 for prompt and first half, although the asking price for the new year was \$14.50, and comparatively few furnaces would shade this price, such as did so making the price on especially select business. The month ended with prices low, but all interests optimistic, and the belief firm that a strong buying movement is indicated for January. The monthly average prices at Cincinnati of No. 2 Northern and No. 2 Southern foundry, also averages of leading classes of scrap, are shown in the following table:

	Southern No. 2.	Northern No. 2.	Machinery	R. R. Net ton.	No. 1 Heavy melting steel. Net ton. Gr. ton.
January	\$16.50	\$16.61	\$12.75	\$13.81	\$14.38
February	16.19	16.60	12.50	13.25	13.84
March	15.25	15.83	10.63	10.63	11.13
April	14.50	15.45	11.00	11.85	11.80
May	14.75	15.95	12.13	13.13	13.06
June	14.81	15.83	13.50	14.75	14.12
July	15.65	15.89	13.65	14.05	13.65
August	16.44	16.26	14.13	14.63	14.13
September	17.41	17.25	14.45	14.75	15.45
October	18.06	18.20	14.94	14.88	16.13
November	17.94	18.45	14.19	14.38	15.75
December	17.63	18.45	13.75	14.25	15.38

In the finished lines all local producing interests have steadily increased their output and improved their plants. A feature of the year in the steel trade and steel products has been the remarkable growth of the open hearth furnace output. The coming year will see some eight or ten new open hearth furnaces in operation in southern Ohio alone. In recognition of the demand created for basic a number of furnaces in the South are either preparing to blow in on that product or are making it.

#### Old Material.

Recognized as a leading center for the distribution of scrap, the Cincinnati market has expanded during the year both in importance of individual concerns and additions to the number of plants. The Joseph Goldberger Iron Company was the latest addition to the list, incorporated for \$100,000 November 24, and with the material purchased from the city when the East Front street pumping station plant was sold forming the nucleus of a plant to which machinery and material have been added in the meantime.

Reference to the table giving average prices at Cincinnati will show that the year was one of preparation and buying rather than of selling, but closing at an average advance of \$1 per ton over its opening. All dealers are carrying good stocks and are preparing for one of the busiest years in the history of old material in this market.

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The branch managers of the Dodge Mfg. Company gathered December 17 to 19 at the home office, Mishawaka, Ind., for conference with officers and department chiefs. Following a discussion of plans for 1910 and a review of the work in 1909, a banquet was tendered the visitors at the new Hotel Mishawaka by the company. President M. W. Mix presided and toasts were responded to by many of the participants. The branch managers present were: J. A. Richardson, New York; G. U. Poole, Boston; T. L. Rose, Pittsburgh; E. A. Grant, Philadelphia; W. E. Galway, Cincinnati; S. L. Dickey, Atlanta, Ga.; L. F. Mahler, St. Louis; E. M. Kenyon, Chicago; Burke Richards, Minneapolis.

# THE SHEET AND TIN PLATE TRADES IN 1909.

BY B. E. V. LUTY, PITTSBURGH.

When the official statistics of sheet and tin plate production in 1909 are presented they will probably surprise many in the trade, for there is good reason to believe that the record in tin plate has been exceeded and the record in sheets closely approached, if not also exceeded. There are some in the trade who expect such results, but there are many, probably the majority, who from a cursory review of conditions would be disposed to conclude that the 1909 output has fallen materially short of previous best records in both sheets and tin plates.

The impression that production was not especially heavy in the calendar year 1909 arises chiefly from the fact that the American Sheet & Tin Plate Company was subject to labor troubles in the second half, which it is true threw a great many mills idle July 1, and gave them reduced outputs per mill, as compared with normal, as they were gradually started in operation during the ensuing months. The influence of these incidents has been exaggerated in some quarters, and in considering the question of the output of the entire year it must be remembered (1) that the first half was not affected at all; (2) that in the second half the independent mills were not affected appreciably; in a few cases operations were slightly hampered for a short time by men being drawn away, but this would not make a material impress upon the year's results; (3) the leading interest had many nonunion mills, which ran satisfactorily in the second half; (4) the mills at which there was trouble really did get out a fairly large output, particularly in the closing months of the year.

#### Production Statistics.

Prior to 1905, the official statistics, which are compiled by the American Iron and Steel Association, did not segregate sheets from plates so that the sheet tonnage was entirely lost with the preponderating tonnage of plates. In 1905 the practice was started of presenting separate statistics for No. 13 and lighter. The division, as far as it went, was highly commendable, but it would have been better for the interests of the trade had it gone farther. Perhaps the best division would be to establish a line at box annealed sheets and another farther down at No. 9 or 10.

Statistics denominated those of "black plates for tinning" have been presented from the start, but prior to 1906 the figures bore evidence of including a large tonnage of material which was not tinned, since the tonnage of "black plates for tinning" regularly exceeded the tonnage of tin and terne plates, for instance, by 14,000 or 15,000 tons in both 1904 and 1905. Since 1905 the two sets of statistics have been more in harmony, but in 1908 "black plates for tinning" fell 23,000 tons short of the tin and terne plate total. The swing from an excess to a deficit has obviously been due to differences in the methods of compiling the statistics, probably at the mills, and it would be much to the interest of the trade for the manufacturers to be careful in future, and for the association gathering the statistics to see that a uniform system is used throughout the industry.

The official statistics, in gross tons, have been as follows, the "black plates for tinning" being deducted from the tonnage of sheets:

	Sheets, 13 and lighter.	Black plates for tinning.	Tin and terne plates.
1905.....	983,437	507,587	493,500
1906.....	1,074,525	576,079	577,582
1907.....	1,084,700	504,072	514,775
1908.....	864,901	513,771	537,087

We forecast the production of sheets in 1909 at 1,100,000 gross tons, which would just fall in excess

of the record output made in 1907—1,084,700 tons. Necessarily the forecast is subject to a wide probable error, perhaps 50,000 tons or more.

We forecast the production of tin and terne plates in 1909 at 600,000 gross tons. This is a round figure, and we should expect the official statistics to exceed rather than fall short of it. The record has been the 577,582 tons produced in 1906. The output of black plates for tinning would naturally fall a trifle short of the output of tin and terne plates. There is really little occasion, however, for there to be any statistics of "black plates for tinning." Years ago, when black plates were imported for tinning purposes, the statistics of our own production served a purpose. At present the probable error in compilation by the different mills prevents their being especially useful. The time was that black plates suitable for tinning were naturally used by various manufacturers for other purposes, but of late years several varieties of product have sprung up, running into important tonnages, and lying, as to character, between the ordinary box annealed, one pass cold rolled, and the material which is actually produced for tinning purposes. It would be idle to attempt to report these tonnages separately, and if they do not go with ordinary sheets they will slip into the category of black plates for tinning, spoiling that total and doing no one any good.

#### The Character of Demand.

In very recent years the consumption of sheets and tin plates has been growing more rapidly than the total consumption of steel products. Years ago this was not the case. Sheets and tin plates were consumed in relatively large tonnages before the day of steel cars, steel viaducts and steel skyscrapers. A parallel to that part of the case is found in nails, one of the very earliest lines of important consumption. When the heavy steel lines became prominent, sheets, tin plates and nails were thrown relatively in the background. No new uses have been found for nails, but many new uses are being found for sheets and tin plates, and their consumption, relative to total steel consumption, is growing apace.

Much is said of the growing scarcity of wood and the necessity of using steel instead. No branch of the steel industry gains more by the change than the sheet and tin plate branch; barrels, boxes, lathing, furniture, roof covering and many other lines exhibit a strong tendency to swing from wood to sheets, tin plate or terne plate. Many distinctly new uses, not in the direct line of replacement, have sprung up, electrical sheets leading as to single lines of consumption.

The growth of tin plate consumption for purposes other than putting up the regular canning crops would be impressive if the trade at large stopped to consider the positive proofs that there is a great growth. Prior to 1907 it was the regular practice in the trade for the mills to run, during the closing three months of the year, almost wholly on material for the forthcoming packing season, and January 1 would see large stocks in the hands of mills, fully a million boxes, with considerable stocks in canmakers' hands. In July and August a very large proportion of the mills would be idle. The financial panic in October, 1907, prevented the accumulation of stocks against the coming season, and the end of that year saw less than 50 tin plate mills in operation. In 1908 the mills ran fairly well toward the close, but with practically no accumulation of stocks. In the closing months of 1909 the mills have run almost full, and yet there does not seem to have been any material accumulation of stocks. In the summers of these two years, too, production of tin plate has

been fairly heavy. There is plain evidence in these facts that the consumption of tin plate for other purposes than the canning of the "wet products" has increased very greatly. One can see the evidences of this increased consumption on all hands. Many proprietary articles are put up in tin cans or boxes; tobacco is going into such containers, the ordinary household is continually buying a can of paint for this or that purpose, and so, in many directions important from a tonnage standpoint, because they are every day matters with the 90,000,000 people in this country. The growth in canning the "wet products" is large and satisfactory, but the growth of consumption in other directions is much larger, and tin plate is becoming less and less a seasonable product, with prospects of large gains in total output year by year.

It may be mentioned incidentally that it is only by comparing statistics of production that the growth in tin plate production can be observed; the growth has occurred more by increased outputs per mill than by increases in the number of mills, although there has been a fairly large increase in the number of independent mills.

#### Prices in 1909.

The course of sheet prices in 1909 was not as clearly defined as usual. Following the general decision of February 18 to throw the market open on finished steel products, except rails, the American Sheet & Tin Plate Company on February 24 announced some reduced prices, but these prices were afterward shaded in competition. Some extremely low prices were made which did not represent the market at the time, but it is largely a matter of opinion as to where the open market stopped and the exceptions began. The lowest prices were made in May and June. Thereafter the market firmed up and finally reached a point from which definite advances could be made. An effort is made to indicate the course of the market in the table below, which gives prices f.o.b. Pittsburgh, as follows:

January 1: Opening prices, subject to the 5-cent rebate, and to some shading on occasion.

February 24: The first definite naming of prices after the break.

May-June: The approximate low points, although not extreme prices.

September 1: Roughly the time when the market became firm and steady.

September 24: The date when the first regular advance became effective, although the advance on blue annealed sheets occurred a fortnight earlier.

November 12: The date when the second regular advance took effect.

			Painted Galvanized		
Black.	Galvanized	Blue.	cor-	cor-	
No. 28.	No. 28.	No. 10.	rugated.	rugated.	
January 1.....	2.50	3.55	1.80	1.75	3.10
February 24....	2.20	3.25	1.65	1.65	2.90
May-June.....	2.15	3.15	1.60	1.50	2.70
September 1....	2.20	3.25	1.65	1.55	2.80
September 28....	2.30	3.35	1.70	1.60	2.85
November 12....	2.40	3.50	1.75	1.70	3.00

Tin plate showed a much less complicated movement, as the market was well held practically all the time. The opening price was \$3.70, Pittsburgh, or \$3.65, less the 5-cent rebate. March 15 there was a reduction to \$3.40 net, and September 28 and November 12 successive advances of 10 cents each, making the closing price \$3.60.

Having regard to the fact that the nominal prices at the opening of the year were not well held, while the market at the close was very firm, the statement can be made that the average price of sheet and tin plate products was practically as high at the close as at the opening. Certainly there was not an average net decline for the year of as much as \$1 per ton. Compared with 1907 prices, less rebate, present prices are lower by 15 cents per 100 lb. on black sheets, 10 cents on galvanized sheets, 10 cents on blue annealed,

10 cents on painted corrugated, 20 cents on galvanized corrugated and 25 cents on tin plate.

#### Spelter and Galvanized Sheets.

The sharp advance in spelter from May to November, generally assumed in the trade to have been due to manipulation, worked a decided hardship to galvanizing interests. The average monthly price of spelter, East St. Louis delivery, averaged from daily quotations, have been as follows:

	Cents.		Cents.
January .....	5.04	July .....	5.28
February .....	4.80	August .....	5.61
March .....	4.65	September .....	5.67
April .....	4.84	October .....	6.08
May .....	4.98	November .....	6.25
June .....	5.29	December .....	6.14

The high point was the 6.25 cents maintained in November, the year closing at 6.10 cents. The sharp advance dated from about May 1, when the price was 4.90 cents, while the 6.25 cents price was first touched October 20, making an advance of 1.35 cents in less than six months.

Direct comparisons cannot be made between the price of spelter and the price of galvanized sheets, because the price of black sheets varies according to other conditions, nor can exact comparisons be made of spelter with the spread between black and galvanized sheets, for the reason that changes in the spreads between different gauges of galvanized sheets rarely occur, yet the amount of spelter consumed is different in the production of each gauge of the galvanized product, for the weight of coating does not vary materially with different gauges. Comparisons with No. 28, the most common gauge, show a greater difference in cost of manufacture, as spelter varies, than occurs with heavier gauges. The subject is nevertheless interesting when pursued as to No. 28, taking the spreads which have hitherto prevailed between No. 28 black and galvanized and the average price of spelter at the time.

From January 1, 1904, to November 14, 1904, the spread between black and galvanized sheets, No. 28, was \$1 per 100 lb., the average price of spelter in the period being 4.85 cents.

November 15, 1904, to January 24, 1907, the spread was \$1.05, and spelter averaged 5.95 cents.

January 24, 1907, to January 6, 1908, the spread was \$1.15, and spelter averaged 5.90 cents.

January 6, 1908, to the end of the year the spread was \$1.05 and spelter averaged 4.62 cents.

Thus we have:

	Spelter.		Spelter.
Spread.	Cents.	Spread.	Cents.
\$1.00.....	4.85	\$1.15.....	5.90
1.05.....	5.95	1.05.....	4.62

The above figures do not hang together, indicating that profits in galvanizing have varied greatly at different times. Approximately 12½ lb. of spelter are required for 100 lb. of galvanized sheets, No. 28, which would make 5 cents per 100 lb. galvanized sheets and 0.40 cents per pound of spelter correspond. The longest period considered above was when the spread was \$1.05 and spelter averaged 5.95 cents, the period being November 15, 1904, to January 24, 1907, over two years. Assuming this to have been a correct alignment, both the preceding and the following spreads were too high. The present spread of \$1.10, with spelter at 6.10 cents, is too low as compared with some of the periods in the past few years and too high as compared with others.

#### Tin Mill Operations by Quarters.

In previous reviews we have attempted to present the operations of the American Sheet & Tin Plate Company and the independents by quarters, so as to show the extent of operations in different seasons of the year. It was somewhat difficult to carry the figures through the second half of 1909, on account of

some labor disturbances, but the comparison of figures is especially interesting on account of that very incident. In order to make the figures strictly comparable it was necessary to reduce the leading interest's operations, at the plants where new men were being trained, to the equivalent of mills at full normal operations, which was done to the best of the writer's ability, although there was considerable latitude of choice. The case involved less than one-quarter of the total operations in the second half, or less than one-tenth of the operations for the entire year, so that any possible excess or deficiency in the estimate would not materially affect the year's average.

The average number of tin mills operated per quarter, subject to the correction mentioned, and including, in the case of the independents, only the plants which regularly tin their output, has been approximately as follows:

	1907.		1908.		1909.	
	Amer.	Inde-	Amer.	Inde-	Amer.	Inde-
	ican.	pendents.	ican.	pendents.	ican.	ents.
First quarter.....	215	59	142	43	166	76
Second quarter.....	231	63	207	69	198	79
Third quarter.....	163	64	145	65	114	83
Fourth quarter.....	72	50	109	67	142	85
Average.....	170	59	151	61	155	81

The above table illustrates in part what has been said about the operation of mills at different seasons of the year. While prior to 1907 the mills ran fairly well in the fourth quarter, in that year they did very little. In 1908 there was an improvement, but there was little production for stocks. In 1909 the fourth quarter operations were relatively heavy. It will be observed that the independents operated even better in the second half of the year than they did in the first half. The proportion of independent to total operations was 26 per cent. in 1907, 29 per cent. in 1908 and 34 per cent. in 1909.

The great increase in tin plate production in recent years has been attained chiefly by increased outputs per mill, rather than by an increase in the number of mills operated. The gain has been rapid since the limit of output was abrogated with the Amalgamated Association the middle of 1905. Below we give the approximate average number of mills operated per year, with the actual production, as officially reported, and carry out the equivalent output per mill. As this quotient involves the operation of one mill for 52 weeks, it should not be assumed that a given mill would average as large an output, as it would be subject to closing for repairs, &c.

#### Average Mills Operated, Total Tin Plate Production and Average Per Mill.—Gross Tons.

	Mills operated.	Total production.	Per mill.
1904.....	231	458,000	1,938
1905.....	229	493,500	2,155
1906.....	264	577,562	2,188
1907.....	229	514,775	2,248
1908.....	212	537,087	2,534

The steady increase in output per mill is remarkable. It is not to be supposed that 1909 saw a setback. With its 236 mills, only at the 2534 tons shown in 1908, the year's output would be approximately 600,000 gross tons.

#### Changes in Tin Mill Lists.

The American Sheet & Tin Plate Company opened the year with the following tin plate plants:

	Mills.
American, Elwood, Ind.....	28
Anderson, Ind.....	7
Cambridge, Ohio.....	7
Chester, W. Va.....	7
Crescent, Cleveland, Ohio.....	6
Greer, New Castle, Pa.....	20
Humbert, Connellsville, Pa.....	6
La Belle, Wheeling, W. Va.....	10
Laughlin, Martins Ferry, Ohio.....	23
Monongahela, Pittsburgh, Pa.....	8
Morewood, Gas City, Ind.....	8

National, Monessen, Pa.....	25
Pennsylvania, New Kensington, Pa.....	8
Pittsburgh, New Kensington, Pa.....	8
Sabraton, Morgantown, W. Va.....	10
Sharon, Pa.....	20
Shenango, New Castle, Pa.....	30
United States, McKeesport, Pa.....	11
Total.....	242

The total number operated at any time in 1908 was 213, Anderson, Humbert, Monongahela and Morewood being idle the entire year. The total operated at any time in the first half of 1909 was 202, the United States Works also being idle. When the walkout of the Amalgamated Association occurred, covering American, Greer, La Belle, Laughlin, Sharon and Shenango, 131 mills, there were left 71 nonunion mills in operation; to this the company at once added Monongahela and United States, which had been nonunion when last operated, making 90 nonunion mills in operation. At four of the plants at which the walkout occurred, American, Greer, Sharon and Shenango, operations were gradually resumed, but no attempt was made to resume at La Belle or Laughlin. Humbert was placed in operation late in the year and preparations were made to start Morewood, neither of these plants having lately been operated. At the same time the dismantling of Anderson was commenced, this plant being dropped from the list. This left the position at the end of the year that the company carried 235 mills on its list, with La Belle and Laughlin, containing 33 mills, idle, and the remaining 202 mills either operating or in line to operate shortly.

The only changes among independent tin mills, referring here only to interests which tin their product, were that the Standard Tin Plate Company put four additional mills in operation July 6, making a 10-mill plant, while the Osterberg Tin Plate Company bought the Waynesburg, Pa., plant, long idle, and after modernizing the plant put it in operation, November 29. It contains four tin mills, 26 x 32, and six 64-in. Jumbo tin machines with patent cleaners. This left the actually operative tin plate plants at the close of the year as given before, the list covering only the interests which actually tin their product, and rating the leading enameling interest at the number of mills the output of which it is estimated to tin. The Wilkes Rolling Mill Company, Sharon, Pa., commenced to tin a portion of its iron sheet product.

	Mills.
Alcancia Company, Avonmore, Pa.....	3
Carnahan Tin Plate & Sheet Company, Canton, Ohio.....	7
Follansbee Bros. Company, Follansbee, W. Va.....	6
Griffiths Charcoal Iron Mills, Washington, Pa.....	2
Lalance & Grosjean Mfg. Company, Harrisburg, Pa.....	4
McKeesport Tin Plate Company, McKeesport, Pa.....	10
National Enameling & Stamping Company, Granite City, Ill.....	6
Osterberg Tin Plate Company, Waynesburg, Pa.....	4
Phillips Sheet & Tin Plate Company, Clarksburg, W. Va.....	12
Pope Tin Plate Company, Steubenville, Ohio.....	12
Standard Tin Plate Company, Canonsburg, Pa.....	10
N. & G. Taylor Company, Cumberland, Md.....	8
Washington Tin Plate Company, Washington, Pa.....	5
Whitaker-Glessner Company, Wheeling, W. Va.....	5
Total.....	94

It is from the above list that the operations of independent tin mills hitherto given are compiled.

In addition to the above the Atlanta Tin Plate & Sheet Mill, Atlanta, Ind.; the Niles Iron & Steel Company, Niles, Ohio, the De Forest Sheet & Tin Plate Company, Niles, Ohio, a new interest; and the Union Sheet & Tin Plate Company, Marietta, Ohio, make black plate specialties but do not conduct tinning operations at present.

A larger amount of tin mill erection has been in progress of late than for several years, and within a few months 30 additional tin mills will be available, as noted below.

The Phillips Sheet & Tin Plate Company, operating a 12-mill plant at Clarksburg, W. Va., is bringing to completion a 10-mill plant at Weir City, near Hollidays

Cove, W. Va. The mills will probably commence operations early in February, the tin house following about a month later.

The McKeesport Tin Plate Company, McKeesport, Pa., is completing a 10-mill addition, of which five mills will probably start about March 1 and the remaining five about April 1.

The Jones & Laughlin Steel Company is bringing to completion the first 10 mills of its proposed 30-mill plant at Aliquippa, Pa., the first unit being expected to be in operation early in the second quarter of the year, with the second and third units to follow at later dates.

Thus the total of 94 independent tin plate mills noted above should be increased by April 1 to 114, and well before July 1 to 124 mills.

The American Sheet & Tin Plate Company purposed to continue its regular policy of bettering its facilities by building a large tin plate plant at Gary, Ind. Plans were formulated more than a year ago for a large plant at that place, to embrace 50 sheet and 50 tin mills. Late in 1909 it was officially announced that work would commence at once at Gary upon "plate, jobbing and sheet mills," the inference being that tin mills would follow at a later date. The company, as well as its predecessor, the American Tin Plate Company, has dismantled many tin plate plants and at the same time improved others. The original company, organized December 15, 1898, acquired no less than 39 tin plate

plants, containing 279 mills. Afterward there were acquired Canonsburg, Muskegon, Sharon and Morgantown, containing 37 mills, making a grand total of 316 mills. These were not all operated at any one time, but at times in 1899 more than 250 were operated. The company's output in that year was approximately 350,000 tons, almost the entire production of the country. In recent years its output has been considerably larger, despite the reduction in the number of mills it has operated and despite the springing up of independent production.

#### INCREASE IN SHEET MILLS.

The American Sheet & Tin Plate Company, having brought its sheet plants to a modern standard, made no important changes in its sheet mills in the year, the list remaining at 18 plants containing 186 mills, of which 176 are regular sheet mills, eight are usually classed as jobbing mills and two are light plate mills.

A year ago we listed 28 independent sheet interests, comprising 169 sheet mills, all regularly operative. Transferring to the sheet list several odd mills which were then classed as tin mills and adding a couple of old plants which were revived, makes the total of old mills 194. To this total there were added in 1909 about 36 new mills, making 230. There are in course of erection, January 1, 1910, a total of about 34 sheet mills, which will bring the grand total to about 264 sheet mills, all regularly operative.

## THE YEAR 1909 IN COPPER.

BY H. M. COLE.\*

History has been made fast in the development of the copper mining industry in the past 12 months. Notwithstanding much uncertainty at various periods during the year concerning the outlook, there is reason to believe that at this writing much has been done to bring about a degree of co-operation among the largest producing interests, which means much for the industry, at least in the early months of 1910.

During the past year the output of copper exceeded all previous records, and at this time the production of the American continent—including the United States, Canada and Mexico—is at the stupendous rate of 1,400,000,000 lb. per annum.

#### THE COPPER PRODUCERS' ASSOCIATION.

One of the striking developments of the year was the organization of the Copper Producers' Association, which represents to-day probably between 95 and 98 per cent. of the copper produced and smelted on the North American continent. The purpose of the association is to gather, compile and disseminate official figures concerning the production, export shipments and domestic deliveries of copper whereby the copper consuming as well as the copper producing interests might be accurately informed concerning the month to month developments in the copper producing field. The credit for the organization of this most efficient organization is to be given to L. Vogelstein of New York and Col. T. L. Livermore, vice-president of the Calumet & Hecla Mining Company, Boston. The conception as to the wisdom of forming such an organization is credited to Mr. Vogelstein; the credit for carrying his plans into execution and bringing together all of the producing and smelting interests belongs to Colonel Livermore, who has been unanimously chosen president of the association. We present herewith by months the statistics issued by this association which comprehend in small space a volume of illuminating information concerning the progress of the producing copper mines in the matter of output during the past year. These are the most valuable and comprehensive figures ever issued concerning the copper producing industry:

Stocks.			
	Pounds.	Changes by months.	Total change since January 1.
December 1.....	153,003,527	Dec. 506,099	Inc. 30,646,261
November 1.....	153,509,626	Inc. 2,036,854	Inc. 31,152,360
October 1.....	151,472,772	Inc. 15,840,207	Inc. 29,115,506
September 1.....	135,632,565	Inc. 13,035,958	Inc. 13,275,299
August 1.....	122,596,607	Dec. 32,261,454	Inc. 239,341
July 1.....	154,858,061	Dec. 14,990,080	Inc. 32,500,795
June 1.....	169,848,141	Dec. 13,349,932	Inc. 47,490,975
May 1.....	183,198,073	Inc. 918,171	Inc. 60,840,907
April 1.....	182,279,902	Inc. 8,995,654	Inc. 59,922,736
March 1.....	173,284,248	Inc. 29,154,203	Inc. 50,927,082
February 1.....	144,130,045	Inc. 21,772,779	Inc. 21,772,779
January 1.....	122,357,266	.....	.....

#### Production.

Production.			
	Pounds.	Changes by months.	Production since January 1.
November.....	121,618,369	Dec. 3,039,340	1,287,574,401
October.....	124,657,709	Inc. 6,634,570	1,165,956,032
September.....	118,023,139	Dec. 2,574,005	1,041,298,323
August.....	120,597,234	Inc. 2,319,631	920,267,446
July.....	118,277,603	Inc. 1,710,110	799,670,212
June.....	116,567,493	Dec. 1,788,653	681,392,609
May.....	118,356,146	Inc. 4,781,854	564,825,116
April.....	113,574,292	Dec. 3,484,369	446,468,970
March.....	117,058,661	Inc. 13,357,844	332,894,678
February.....	103,700,817	Dec. 8,434,383	215,836,017
January.....	112,135,200	.....	112,135,200

#### Export Deliveries.

Exports.			
	Pounds.	Changes by months.	Exports since January 1.
November.....	55,266,595	Dec. 994,643	621,396,050
October.....	56,261,238	Inc. 6,183,461	566,129,455
September.....	50,077,777	Inc. 1,695,073	509,868,327
August.....	48,382,704	Dec. 26,636,270	458,680,335
July.....	75,018,974	Inc. 4,052,517	410,297,631
June.....	70,966,457	Inc. 423,704	335,278,657
May.....	70,542,753	Inc. 5,432,642	264,312,200
April.....	65,110,111	Inc. 5,919,068	193,769,447
March.....	59,191,043	Inc. 28,222,547	128,859,336
February.....	30,968,496	Dec. 7,481,301	69,468,293
January.....	38,449,797	.....	.....

#### Domestic Deliveries.

Deliveries.			
	Pounds.	Changes by months.	Deliveries since January 1.
November.....	66,857,833	Inc. 498,216	635,532,050
October.....	66,359,617	Inc. 14,254,462	568,674,217
September.....	52,105,155	Dec. 7,509,052	502,314,600
August.....	59,614,207	Dec. 15,905,876	448,747,447
July.....	75,520,083	Inc. 14,928,967	389,133,240
June.....	60,591,116	Dec. 572,200	313,613,157
May.....	61,163,325	Inc. 13,617,315	253,032,041
April.....	47,546,010	Dec. 1,325,954	191,858,716
March.....	48,871,964	Inc. 5,293,846	144,312,706
February.....	43,578,118	Dec. 8,284,506	95,440,742
January.....	51,862,624	.....	.....

Total Deliveries.			
	Pounds.	Changes by months.	Since January 1.
November . . . . .	122,124,468	Dec. 496,387	1,256,928,140
October . . . . .	122,620,855	Inc. 20,437,923	1,134,803,672
September . . . . .	102,182,932	Dec. 5,815,979	1,012,182,817
August . . . . .	107,996,911	Dec. 42,542,146	907,427,782
July . . . . .	150,539,057	Inc. 28,981,484	799,430,871
June . . . . .	131,557,573	Dec. 148,505	648,891,814
May . . . . .	131,706,078	Inc. 19,049,957	517,334,241
April . . . . .	112,656,121	Inc. 4,593,114	385,628,163
March . . . . .	108,063,007	Inc. 33,516,393	272,972,042
February . . . . .	74,546,614	Dec. 15,815,807	164,909,035
January . . . . .	90,362,421	.....	90,362,421

Second in importance has been the marvelous strides which have been made by the low grade porphyry mines, which a year ago were just entering upon their productive career. These porphyry mines claim to be able to mine, smelt, refine and sell their copper for a total cost of less than 8 cents per pound from ore which yields on the average less than 25 pounds of copper per ton. The spectacular successes among the low grade concentrating propositions are the Utah Copper Company, Bingham, Utah, and the Nevada Consolidated Copper Company, Ely, Nevada. These two properties give promise of an early ability to produce jointly 150,000,000 pounds of copper per annum at a cost, as above stated, of not exceeding 8 cents per pound.

**Outpouring of Low Cost Copper Disturbs Large Producers.**

While these low cost claims are not accepted by some of the other large producing interests, more particularly the Amalgamated Copper Company, whose copper costs an average of 8 cents per pound, it is very evident that the latter have seen the handwriting on the wall and are very much disturbed by reason of the tremendous outpouring of low cost copper on the market. It is not unnatural, therefore, that there should have been overtures looking to some sort of a combination of a large percentage of the copper output in this country not already controlled by the Calumet & Hecla and the Phelps-Dodge interests.

At the present time the only definite and tangible progress which has been made toward a consolidation has been the proposed consolidation of the Utah Copper, the adjoining Boston Consolidated and the Nevada Consolidated companies. It is proposed to merge the Boston Consolidated and the Nevada Consolidated into the Utah Copper Company, through the exchange of  $2\frac{1}{2}$  shares of Boston Consolidated for one of Utah Copper and  $2\frac{1}{2}$  shares of Nevada Consolidated for one share of Utah Copper, for which purpose the stock issue of the last named company is to be increased to 2,200,000 shares.

This proposed combination possesses possibilities of an annual output of 200,000,000 pounds of copper per annum, produced at a cost which the insiders claim should yield, on 14 cent copper, a profit of between \$4 and \$5 per share on 2,200,000 shares. It is thought to be the first unit of a very much larger consolidation later on, to include the Amalgamated and Cole-Ryan groups of mines. At the moment, there is little discernible evidence that either the Cole-Ryan or Amalgamated interests are moving toward a combination, but they may be working quietly and may be holding back the announcement of their plans until they are sure of success beyond any peradventure. It is not impossible, also, that the recent Standard Oil decision has considerably modified the enthusiasm of those who were planning a big copper consolidation, and it is entirely probable that some assurance from Washington will be sought before any chances are taken which might involve any violation of the Sherman antitrust law.

**Curtailment of Output.**

The Calumet & Hecla Mining Company of Lake Superior, which produces the purest grade of copper

known the world over, remains firm in its determination to avoid even the appearance of any co-operation with other copper producers involving any regulation of the price or output of the metal. Notwithstanding its announced determination to do nothing which savors of any purpose to combine with others in the regulation of output, the Calumet & Hecla, on its own initiative and in its own way, is doing more to benefit the copper situation—from the standpoint of the copper producer—than any other one producing interest.

Since the first of January last, this company has curtailed its output of refined copper 14 per cent. It is producing what is technically called "mineral" up to the full capacity of its plant, but it is only smelting into refined copper about 86 per cent. of this mineral product of its stamp mills. In this way it has withheld from the market during the past year something like 11,000,000 pounds of copper. This is a very striking curtailment by a company whose independent position has been often misrepresented and which has been accused repeatedly of an obstinate refusal to do anything looking to the improvement of the statistical position of the metal.

Never before has the American copper production been made at a lower cost than in 1909; never has there been greater efficiency or a wiser economy shown in the mining, smelting and refining of the red metal. The result has been that very fair profits have been shown to the holders of copper shares, notwithstanding that the price of copper during the past year has averaged less than 13½ cents per pound. While the cost of producing copper has not been brought to the irreducible minimum, still the science of treating the ore has surely made progress the past year, and this has been reflected, as above stated, in such profits for the copper producing interests as have done much to offset the relatively low price received.

At the present time there are indications that the large copper interests are in agreement as to the wisdom of curtailing the output. It is not believed that they are working illegally, but that they have individually come to the conclusion that the best interests of the industry will be served if less energy is shown in flooding the market with supplies which cannot be absorbed at the present rate of the world's consumption. If this determination is carried into effect, it will mean, of course, that the present enormous surplus of 375,000,000 pounds of copper will be gradually reduced. The consumption of copper in this country and abroad is surely expanding, and the large wire and brass manufacturers are buying and consuming a steadily increasing amount of copper.

**The Outlook.**

The writer expects to see a material improvement in the statistical position of the metal as shown by the December statement of the Copper Producers' Association, to issue January 10, and a still further improvement to be shown by the January statement, to issue February 10. The visible betterment in the statistical position of copper should provide the fuel necessary to keep alive the expanding speculative interest in copper shares plainly manifest at the present time. Speculation is keen in the Lake Superior shares as the phenomenal developments at the Lake Copper Company's property in Ontonagon County, Mich., have created a degree of optimism concerning that district which is inflaming the minds and pocketbooks of the speculative public in Boston and in the Michigan copper country. It is not unlikely that this rampant copper share speculation will be over-done—it always is—but the end is not yet in sight.

The production of copper in North America in the year 1909 probably amounted to 1,317,322,000 pounds, apportioned among the important copper camps, as follows, similar figures of 1908 and 1907 being also presented for purposes of comparison:

	1909. Pounds.	1908. Pounds.	1907. Pounds.
Arizona	325,622,000	262,200,000	240,000,000
Montana	312,000,000	293,800,000	280,250,000
Lake	237,000,000	224,500,000	230,000,000
Utah	117,000,000	87,750,000	98,750,000
California	65,000,000	27,750,000	21,000,000
Nevada	53,700,000	7,500,000	.....
Other States	45,000,000	37,000,000	15,000,000
Mexico-Canada	162,000,000	125,000,000	150,000,000
Totals	1,317,322,000	1,065,500,000	1,015,000,000

The most disturbing factor in the copper situation the past year has been the almost alarming increase in the foreign surplus. This so-called foreign visible supply represents copper in London warehouses or afloat thereto. On December 1 this supply stood at 236,864,320 pounds, being more than twice as large as on January 1 a year ago; in fact, it stands as the highest point reached since the days of the Secretan Syndicate. The belief has been entertained that a very large portion of the indigestible surplus on this side of the water has been shipped abroad and placed in London warehouses where it is more easily financed, copper warrants being issued against the copper in store and these warrants financed by London bankers. Below is a table showing the growth in the foreign visible supply in London since January 1, 1908. In parallel columns are also shown the increase which has taken place the past year in pounds and the increase expressed in percentages:

	1909. Pounds.	1908. Pounds.	Increase. Incr'se. Pounds. Per ct.
January 1	124,716,480	44,150,400	80,566,080 182
February 1	118,564,400	46,278,400	72,286,000 156
March 1	117,140,800	46,531,520	70,609,280 151
April 1	115,032,960	52,113,600	62,919,360 120
May 1	114,056,320	50,660,160	54,396,160 91
June 1	127,352,960	66,793,920	57,559,040 82
July 1	150,928,960	84,472,640	66,856,320 79
August 1	171,492,180	94,350,160	77,172,000 81
September 1	197,608,320	100,961,280	96,647,040 95
October 1	210,226,240	112,624,480	97,601,760 86
November 1	222,559,680	115,431,680	107,128,000 92
December 1	236,864,320	116,477,760	120,386,560 103

In conclusion it may be said that the outlook for 1910, while not as brilliantly promising as some of the more optimistic might hope to see, still is one which gives evidence of gradual betterment, at least during the first six months of the new year. The antagonisms which existed during the first part of the year between prominent producing interests seem, for the time being at least, to be less severe, as their representatives have been in conference, having in view the formation of some sort of a consolidation. A vast amount of data must be secured and passed upon before valuations can be fixed governing ore reserves, surface equipment, copper costs, &c., and those who are looking for a speedy announcement involving all this tremendous amount of work must not expect results too soon. One factor having great weight in the minds of those seeking to bring about this great combination is the fact that at 13½ cents per pound, with 60 per cent. of the American output sold abroad, one of our great natural resources—copper ores—is not being duly conserved.

When once the ore is taken from the ground, from that moment begins the irreparable depletion of a mining company's mineral assets. It would seem imperative, therefore, that some co-operative action must be taken looking to the correction of so much of the over-production of copper as results in a needless sacrifice of these underground assets at a price which does not show a good and sufficient profit over the cost of production. The progress of civilization demands copper and it demands copper in steadily increasing quantities.

The present low price of copper has commended it to many manufacturers who would be obliged to leave it out of their specifications if the price was 25 cents as was the case three years ago. In other words, the present low price for copper is not without its compensating advantages. Its cheapness recommends it; the low price popularizes its consumption, and thus it

may develop that the past year of 13½-cent copper, while lower than many authorities expected would be the average, has so broadened the market as to mean much for the future stability of the metal.

### Car and Locomotive Building in 1909.

The statistics of new cars and locomotives built in the United States in 1909, as given by the *Railroad Age Gazette*, show an increase of 20 to 25 per cent. over the number in 1908, but the total was still only a fraction of that for 1907—about one-third in the case of cars. More cars and locomotives were available for use last year than in 1908. Throughout the year most roads kept their shops busy putting their rolling stock in shape. Normally 5 per cent. of cars are in shops. It reached 10.18 per cent. in July, 1908, and was still high, at 7.73 per cent., in June, 1909.

In the past year 53 car building companies in the United States and Canada (output of one small plant estimated) built 96,419 cars, which is 23 per cent. more than the number built in 1908. These figures include subway and elevated cars, but not street railroad and interurban cars. The output of railroad companies' shops is not included. Of the cars built in the United States, 84,416 were freight cars for domestic service, 2,435 freight cars for export, 2,599 passenger cars for domestic service and 150 passenger cars for export. Of the freight cars, 63,763 were of steel or had steel underframes; of the passenger cars, 1,650. Canada built 6,661 freight cars for domestic service, 58 freight cars for export, 99 passenger cars for domestic service and one passenger car for export. In 1908 Canada built 8,598 freight cars and 79 passenger cars. The following table shows the cars built during the past 11 years:

Year.	Passen-			Passen-			
	Year.	Freight.	ger.	Total.	Year.	Freight.	ger.
1899	119,886	1,305	121,191	1905	165,455	2,551	*168,006
1900	115,631	1,636	117,267	1906	240,503	3,187	*243,670
1901	136,950	2,055	139,005	1907	284,188	5,457	*289,645
1902	162,599	1,948	164,547	1908	76,555	1,716	*78,271
1903	153,195	2,007	155,202	1909	93,570	2,849	*96,419
1904	60,806	2,144	62,950				

\* Includes Canadian output.

Returns from 14 locomotive builders in the United States and Canada (estimating the output of two small plants) show a total of 2,887 engines. Of the 2,653 built in the United States, 2,362 were for domestic use and 291 for export. These figures include 16 electric and 119 compound locomotives. The Canadian engines, 234, were all for domestic service. Comparisons for the last 17 years are given in the following table:

Year.	No. built.	Year.	No. built.	Year.	No. built.
1893	2,011	1899	2,475	1905	*5,491
1894	695	1900	3,153	1906	*6,952
1895	1,101	1901	3,384	1907	*7,362
1896	1,175	1902	4,070	1908	*2,342
1897	1,251	1903	5,152	1909	*2,887
1898	1,875	1904	3,441		

\* Canadian output.

Regarding the decision of the Youngstown Sheet & Tube Company, Youngstown, Ohio, to carry its own liability insurance, we are advised that the company expects to fix a minimum price to be paid in cases of death and major accidents, such as the loss of an arm or a leg or one or both eyes, and the minor accidents will be settled on an equitable basis, as the circumstances and the degree of the accident may justify. This department was put in effect January 1.

The Trademark Title Company has been organized at Fort Wayne, Ind., for the purpose of registering and protecting trademarks. It is said to be the only concern of its kind in the country. E. H. Merritt is secretary.

## Concentrating the Lean Ores of the Mesaba Range.

### Extensive Plant of the Oliver Iron Mining Company at Coleraine, Minn., and the Important Developments at the Canisteo and Other Mines.

BY DWIGHT E. WOODBRIDGE.

When the Oliver Iron Mining Company some five years ago decided to develop the lean and sandy iron ores of the western Mesaba range, it took a step of revolutionary character. These ores were too lean for shipment, and the questions surrounding concentration of such material were not sufficiently understood to

direction to and across the Mississippi River in township 55. This is a distance of some 20 miles. By no means all of the iron ore in this region is of such low grade as to require concentration, and as developments and explorations proceed it will be found, doubtless, that much supposed to be valuable merely for such

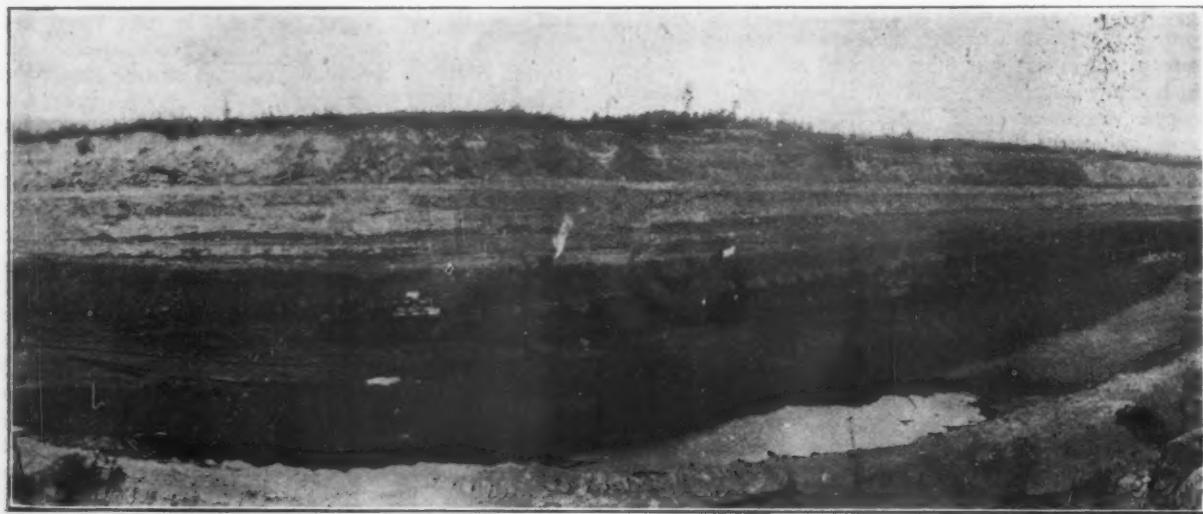


Fig. 1.—The Canisteo Mine.

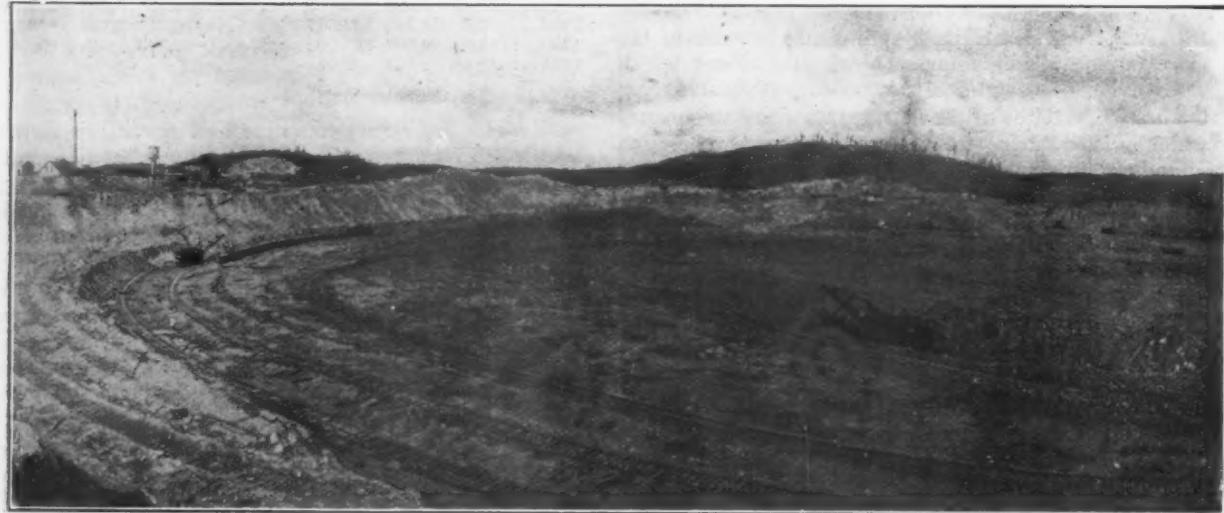


Fig. 2.—The Holman Mine.

permit any man to say that it could be economically and successfully done. There was an enormous tonnage in that part of the district, which, briefly speaking, was composed of iron ore of a sandy character, occurring in the ground as alternating layers of hard hematite and free sand, with varying quantities of the ore-bearing taconite and paint rock. It was recognized that if this free sand, rock and paint rock were to be removed economically enough, a good grade of iron ore could be produced at a sufficiently low cost to be available for shipment and reduction.

What is classed here as the "Western Mesaba" is that portion of the Mesaba range extending through ranges 23, 24 and 25, and from the northeastern corner of township 56 in range 23, in a general southwesterly

treatment is good enough to ship direct. But a great part of all the enormous deposits of ore found therein are quite lean. Could this worthless iron ore be made available for the furnaces, could the western Mesaba be subjected to the same tremendous development that had been carried on along other parts of the range, what an opportunity for effort, what a vision for the enthusiast! There were many hundred millions of tons of this material and the indications were that all high grade ores would be wanted in a comparatively brief period.

#### Early Acquisitions on the Western Mesaba.

Under the presidency of T. F. Cole, the Oliver Iron Mining Company began negotiations for large tracts



Fig. 3.—Experimental Washery at Coleraine.

in that general region, in the firm belief that some method of concentration was to be found. The Canisteo Mining Company, which had been exploring in the vicinity of Trout Lake, in the southwestern corner of township 56-24, had opened a large tonnage, and this was taken over by the Oliver Company in the year 1904 on a royalty basis for the concentrated ore. Other deposits in the same vicinity were also taken. These included the Diamond mine, which was one of the earliest explorations on the entire Mesaba range. The Arcturus, lying in township 57-22, was one of the larger properties secured, and there were many others. The Oliver Company, having taken up this matter, was determined to control as much of the district as possible.

As early as 1901 the Eaton Bros. and C. A. Purdon of Duluth, had become interested in the washing of these Western ores, and had shipped a carload of Arcturus ore to a washery in Cedarburg, Ga., for test. They then had an option on that mine. This test was satisfactory, but the option was not closed. Indeed, the expense of experiments in concentration, of opening these mines on a sufficiently large scale to make mining and treating economically possible, the construction of railroads, &c., for reaching the region, was so great that it might well stagger any but the largest capitalists; and the Oliver Company was practically the only concern that would or could carry forward this work.

Tracks of the Duluth, Missabe & Northern Railway were built to Trout Lake in 1906, and the work of stripping and developing mines on Canisteo lands was begun at once. In the meantime negotiations were taken up with the Great Northern Railway for a lease

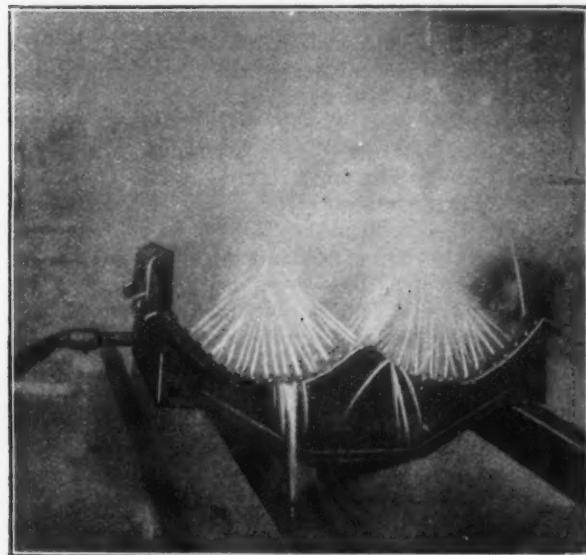


Fig. 4.—One of the Sections of the "Oliver Turbo" Washer.

of its lands on the Mesaba range, and this was closed the following year. Most of the Great Northern properties were in this Western district, and the transaction gave the Oliver Company practically full control of that part of the range. What were known as Great Northern lands had then been explored to show some 170,000,000 tons, of which the Great Northern road held about one-half, either by lease or in fee, largely the former. Since then these lands have been developed to a considerably larger tonnage than this. While by no means all of the Great Northern and associated ore bodies were of this low grade, or of a concentrating nature, many of them were, and the Oliver Company was the logical buyer of the properties.

#### Heavy Outlays in the Canisteo District.

Since that time this company has been actively at work; it has built railroad lines, stripped vast amounts of earth and rock overburden from no less than three mines in this immediate section, has built towns with all modern conveniences and facilities, has carried to successful completion the most extensive experiments in the concentration of iron ores ever undertaken in America, with but one exception, and has continued its efforts to secure lands until it is recognized as the only



Fig. 5.—Waste Dump. Spoil Handled by Water Jets.

operator in that field. It is understood that some \$6,000,000 has been expended in the work of developing the Canisteo District alone, and in building the railroad to the region. Besides the sums spent for the development of these Canisteo properties large amounts have been advanced for the exploration and opening of other mines in that part of the region, especially on Great Northern lands, while the sum of \$4,030,500 will have been paid the Great Northern road in royalties by the beginning of 1910. Other great sums have been paid as royalties to the Canisteo and other companies. Practically all of these latter sums are in the nature of advanced royalties, as but a proportionately trifling tonnage has been mined to this time. All these figures are given merely to show the magnitude of the operation undertaken by the Oliver company when it first entered the western Mesaba on the belief that these ores could be successfully concentrated.

#### The New Concentrating Plant on Trout Lake.

For the concentration of those ores coming out of the Canisteo, Walker and Holman mines, two of which were secured from the Canisteo company, and one in the Great Northern deal, the Oliver company is now erecting a large concentrating works on the shores of Trout Lake. This plant is carrying out the scheme of

treating ores that has been worked out during the past two years by the company's engineers in a temporary works on the shore of the lake. Two of the mines are shown in Figs. 1 and 2 and the temporary concentrating mill in Fig. 3. The new works is some two miles southeast from Coleraine, which town is the company's headquarters for the district. A site was selected on an elevation above the lake that gives ample room for the distribution of any probable accumulation of tailings for years to come, and for the arrangement of trackage most advantageously. The works is reached by a three or four track embankment nearly a mile long that rises in its greatest hight to 120 ft. above the surrounding ground, and this embankment has been made by utilizing spoil from the stripping overburden of the Canisteo mine. From the end of this great fill there is a double track steel trestle approach 650 ft. long.

The concentrating building itself is of steel throughout, 255 ft. long, 162 ft. wide and 90 ft. from the floor to the level of the tracks, on which crude ore is brought from the mines. Some 7000 ft. distant, on the lake shore, is the power plant. This consists of two build-

ings at an elevation of 90 ft. below the rails delivering crude ore from the mines, this difference in level being necessary to obtain a gravity plant. It has been a desideratum that all operations in the mill shall be by gravity, and the elevation of the approaches has accomplished this. These tracks for receiving concentrates are four in number under the mill, and are laid on a 1.2 per cent. grade favoring the load, so that the process of letting down empties from the empty yard and of handling loads between the mill and ore yards is by gravity also.

Crude ore is brought to the top of the mill and dumped directly into the receiving bins. These are separate for each unit and each has capacity for about 300 tons. From its bin ore is slushed down over a set of grizzly bars where large pieces of rock are removed, and on into a revolving cone trommel with 2-in. perforations. Oversize from this trommel goes on a picking belt, where the remaining coarse rock is removed, the product being concentrated lump ore, which is sent direct to the shipping bins. Undersize from the cone trommel is fed to two sets of 25-ft. log washers of a type in use in Southern phosphate mills, except that

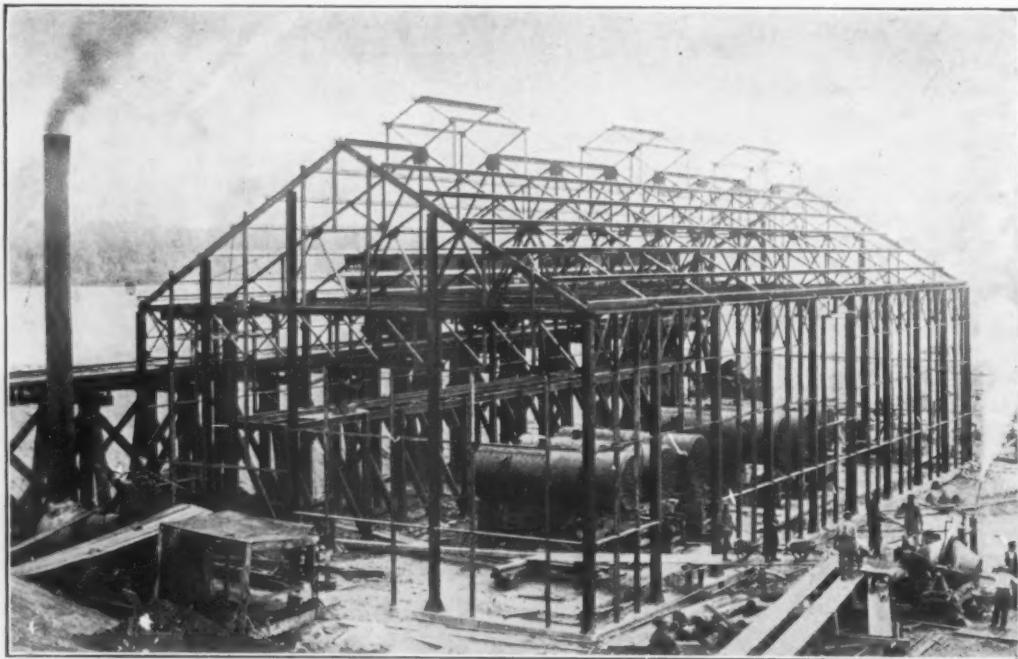


Fig. 6.—Steel Frame of Boiler House for New Concentrating Plant.

ings, also of steel construction, including boiler house 53 x 120 ft. and generator and pump house 82 x 132 ft. All these buildings require some 7000 tons of steel and the erection is being carried on under contract by the American Bridge Company. The central steel work of the main building will be carried outward for 300 ft. to form a tail track for the handling of railroad cars delivering ore to the works, and this construction will later be a part of a proposed extension of the plant. The mill building proper consists of five units of concentrating machinery, each unit complete in itself and capable of independent operation; there is also a small machine shop.

Crude ore is mined by steam shovel in the open pits of the Canisteo, Walker and Holman mines (views of two of which are shown in Figs. 1 and 2), and delivered to the mill over standard gauge, double tracked approaches. The distance from the Canisteo and Walker mine pits to the mill is slightly in excess of two miles, and from the Holman pit entrance about four miles. Tracks for crude ore are owned by the mining company.

#### The Method of Concentrating.

Duluth, Missabe & Northern Railway tracks for the receipt and handling to docks of concentrated ore

provision is made for water feed through the bottom of the washers. These are set inclined about 1 in. to the foot, and the ore is worked up along their length by a series of arms that constitute an endless screw. Ore works out at the upper end and tailings are washed off at the lower. Concentrated product goes out at the upper end to the concentrate draining and shipping bins, while the overflows pass to chip screens for removing light material. These overflows or tailings then are fed to settling tanks. Settled products of these tanks are fed to a small type of log washer locally developed and known as the "Oliver turbo," an illustration of one section of which is given in Fig. 4. This machine differs from the larger log washers in being built in cast hollow bottom sections, the upper portion of the bottoms being perforated with 1-16 in. holes through which water is forced under pressure. In the illustration herewith water is being forced through as in practice. This machine is 4 ft. wide and 18 ft. long, inside measurements. Products of the turbos go to finished concentrate bins, and the overflow, or tails, from this machine are fed to a second set of settling tanks, the products from which go to Overstrom tables. Products of these tables are the final finished material for the concentrate bins, while tailings are wasted.

The scheme of flowsheet for this mill is, therefore, in brief as follows: Crude ore over grizzlies, oversize to waste or ore bins, undersize to cone trommels; trommel oversize to picking belt, waste to rock pile, coarse product to ore bins; trommel undersize to incline log washers, product to bins, tailings to settling tanks; tank product to turbo, tailings to waste; turbo product to bins, tailings to settling tanks; tank product to Overstrom tables, tailings to waste; table product to bins, tailings to waste flume.

The disposal of waste is accomplished as follows: Tailings from settling tanks and tables are collected throughout the mill by launders that discharge into a main flume in the rear of the mill. This flume conducts them some 2000 ft. into Trout Lake. Fig. 5 shows the present waste dump.

Concentrating equipment for each unit includes one receiving bin and set of grizzly bars, one cone screen with 2-in. perforations, one 36-ft. picking belt, two 25-ft. log washers, two chip screens, two 18-ft. Oliver

of four more boilers. The power house installation consists of one 26 and 52 in. by 48 in. cross compound Corliss engine, direct connected to one 1250-kw. alternating current generator carrying 6600 volts; one 26 and 52 x 16 x 48 Prescott cross compound pumping engine (Fig. 7), with a capacity for 12,000,000 gal. per 24 hours, provision being made for future extensions. Water supply for the mill is obtained from Trout Lake, and is pumped through a surface pipe line 30 in. diameter and 7000 ft. long, set on concrete piers to a 100,000-gal. cylindrical steel tank set on a 125-ft. steel substructure. Transmission of power is at 6600 volts, and this is stepped down to a working voltage of 440 volts at the mill. Transformers are placed in a 28 x 35 ft. brick and concrete substation. All concentrating machinery is electrically driven, and each unit of the mill is supplied with one 100-hp. and two 15-hp. motors.

It is expected that these works will be completed and ready for operation by May, 1910. Each unit will

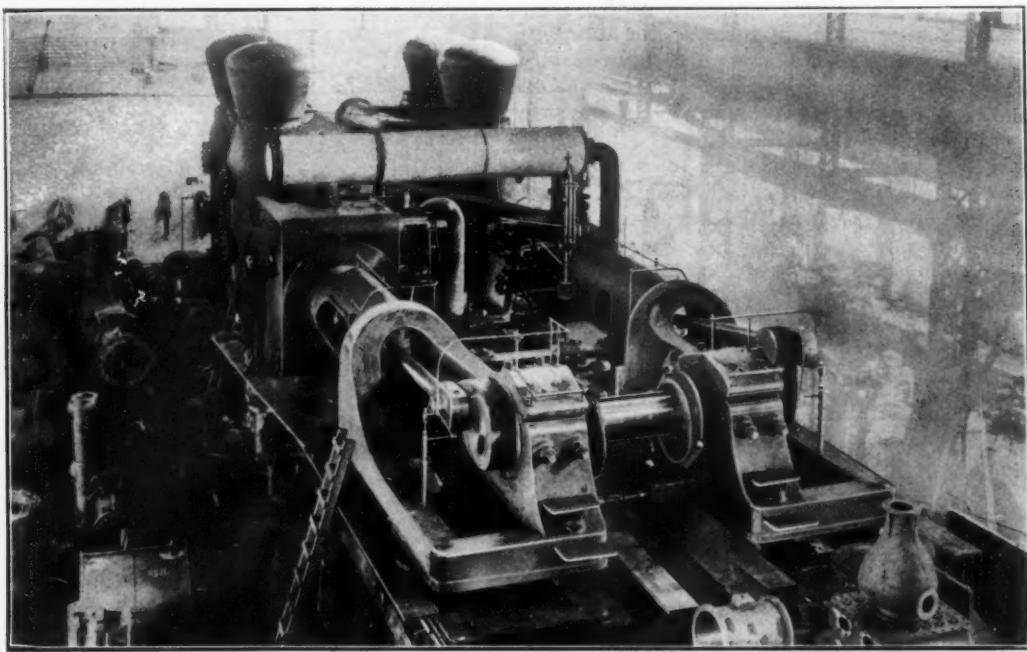


Fig. 7.—Prescott Corliss Cross Compound High Duty Pumping Engine, Mesaba Pattern.

turbos, six settling tanks, 20 Overstrom concentrating tables and concentrate bins.

#### Quality of the Concentrates.

Crude ore will go into the mill in varying qualities, running from about 36 per cent. iron upward, and it is the present intention that the final shipping concentrates shall pass out carrying a percentage of iron in the neighborhood of 57 per cent. Of course ore market and blast furnace conditions will have their effect upon this product. Ore will come from the mill carrying from 15 to a higher percentage of moisture, and no special efforts have been made to reduce this other than by the natural drainage of the ore in bins and during shipment to docks. It is well known that the average moisture content of Mesaba ores as now shipped is in the neighborhood of 10 per cent., some of it running much higher, so the product of this mill will be no higher in moisture than considerable of the ore now shipped direct from shafts. The elimination of paint rock is expected to assist materially in the drainage of these ores after they come from the mill.

#### Power Installations.

The boiler house, Fig. 6, now accommodates an installation of six 72 in. by 18 ft. tubular boilers of the type developed by the Oliver Company for its use. These are arranged in two batteries of three boilers each, while provision is made for the ultimate addition

of four more boilers. The power house installation consists of one 26 and 52 in. by 48 in. cross compound Corliss engine, direct connected to one 1250-kw. alternating current generator carrying 6600 volts; one 26 and 52 x 16 x 48 Prescott cross compound pumping engine (Fig. 7), with a capacity for 12,000,000 gal. per 24 hours, provision being made for future extensions. Water supply for the mill is obtained from Trout Lake, and is pumped through a surface pipe line 30 in. diameter and 7000 ft. long, set on concrete piers to a 100,000-gal. cylindrical steel tank set on a 125-ft. steel substructure. Transmission of power is at 6600 volts, and this is stepped down to a working voltage of 440 volts at the mill. Transformers are placed in a 28 x 35 ft. brick and concrete substation. All concentrating machinery is electrically driven, and each unit of the mill is supplied with one 100-hp. and two 15-hp. motors.

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#### Coleraine a Model City.

In carrying forward its work at the Canisteo, Walker and Holman mines the Oliver Company has looked not alone to the mere details of construction in their narrower sense, but has built a model city at Coleraine, which was named in honor of the then president of the company, T. F. Cole. This city has a slightly and pleasant location on the banks of Trout Lake and was laid out on a broad and liberal scale. The town has been built for the future, with admirable structures of all descriptions. The Oliver Iron Mining Company's offices are shown in Fig. 8. School and other buildings are in keeping. The town was planned with care and forethought, and all its details were carefully worked out in the Duluth offices before a spade was touched. Public improvements, such as water and lighting works, sewerage, street grading, bridges, walks and the like, were put in by the Oliver Company. The design of the company was not to make any profit out of the town site, but to provide a comfortable abiding place,

and to charge what it cost and little or no more. One of the first buildings erected in the new town was a public school that cost \$85,000. Needless to say, this school has already proved inadequate to the demands for accommodations. Village government in Coleraine was not inaugurated until May, 1909, though the foundations of the place were laid in 1904.

**Coleraine District Next in Importance to Hibbing.**

Not far from 14,000,000 cu. yd. of overburden has already been taken from the three mines of this immediate vicinity, almost entirely without the aid of contracting firms; three of the largest open pits of this range of enormous pits have been developed; half a dozen incorporated towns containing many thousands of people have grown up there, and shipments on a large scale will begin the coming spring. Some trifling shipments of ore were made from the Holman pit in 1907 and still less in 1908, but this pit sent out nearly 400,000 tons in 1909, while the Walker shipped 83,000 tons. The Hill mine, a few miles east, will become a shipper in 1910. This mine contains a class of ore not requiring concentration. Figures of the total tonnage of washable and direct shipping ore in the vicinity of Coleraine are not available, chiefly for the reason that explorations have not been completed, but it is safe to state that there are many hundreds of millions of tons, and that the tonnage around the town is not exceeded by that surrounding any point on the entire Mesaba range, only excepting Hibbing, whose annual shipments amount to from 10,000,000 to 12,000,000 tons. The thickness of overburden at these mines is not far from 80 ft., making the stripping problem a serious one.

Much might be said in this review of the personal element, and the names of engineers, skilled con-



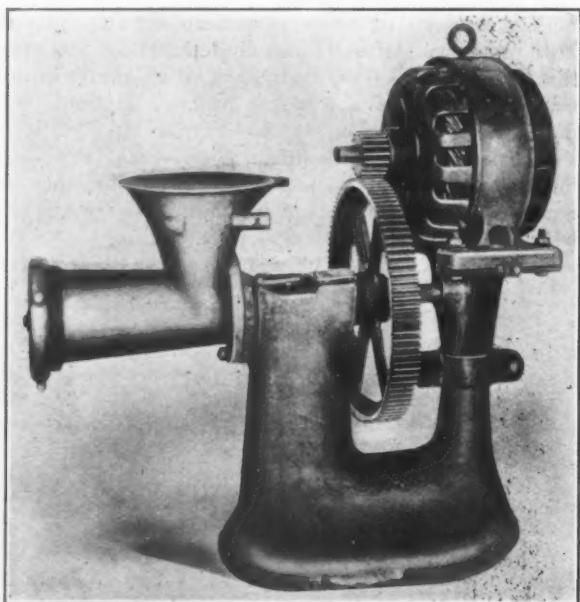
Fig. 8.—Office of the Oliver Iron Mining Company at Coleraine.

centrator men, economists, operators and officials might well be given, all of them entitled to their meed of credit for the successful outcome of this vast undertaking. But with all these men it has been part of their day's work, and it has been done in the line of their professions, to the successful culmination of efforts to which they attach little beyond the mere fact that the work has been done.

The Pacific Hardware & Steel Company, San Francisco, Cal., which is now a New Jersey corporation, will reincorporate under the laws of California. A meeting of the stockholders has been called at Camden, N. J., for January 17, to dissolve as a New Jersey corporation. The company will then be incorporated under the laws of California. There will be no change in capitalization nor any change in the personnel of the company.

**A Compact Motor Driven Meat Chopper.**

The convenience, efficiency and simplicity of the electric motor drive has resulted in its application to a large number of machines of widely differing kinds. An application which is of interest, more on account of the size of the machine to which it is applied than to any new features of the drive, is shown in the accompanying illustration, which is that of a No. 66



A Large Enterprise Meat Chopper Driven by a 10-Hp. Westinghouse Motor.

chopper made by the Enterprise Mfg. Company of Pennsylvania, Philadelphia, Pa., direct connected by spur gears to a three-phase 10-hp. induction motor made by the Westinghouse Electric & Mfg. Company, Pittsburgh, Pa.

This chopper has a capacity for cutting and recutting 1500 lb. of beef three times per hour and 3000 lb. of pork twice per hour for making sausages. A very compact drive is secured by mounting the motor on the chopper frame. This arrangement also possesses the advantage of lifting the electrical equipment above the floor, which is always wet and more or less greasy in a sausage making room. The protection from dirt and grease thus afforded the motor windings and parts is supplemented by the fact that virtually no floor space is occupied by the driving apparatus.

The improved sanitary conditions, as well as the efficiency secured by avoiding moving belts and shafting, are important results of employing electric drive in the preparation of foodstuffs. The self-contained construction of the drive prevents the agitation of dust and foreign particles in the air of the chopping room, and the gear type, it is claimed, has worked a considerable economy in the amount of power consumed. Ordinarily a 10-hp. motor is required with belt drive, but tests made on the installation show that only about three-quarters of that amount is required with the spur gearing used. The low cost of the installation and the economy of power are probably the strongest points in favor of this method of using electric power, although the additional features of convenience, compactness, simplicity and cleanliness should not be overlooked.

On the morning of January 1 fire destroyed the main offices and warerooms of the Lynchburg Foundry Company, Lynchburg, Va., entailing a loss of \$15,000 to \$20,000. The manufacture of pipe at the company's Lynchburg and Radford plants will not be interfered with.

### Mexico's Trade in 1909.

DURANGO, MEXICO, December 23, 1909.—The dawning of the year 1909 found Mexico's business interests still suffering acutely from depression—a legacy from the panic which so greatly disturbed industrial and financial conditions in the United States a year or so previously. Even at the year's beginning, however, there were visible signs of recovery from the adverse effect produced by that severe check to nearly all lines of business activity in the northern republic, upon whose prosperity Mexico so much depends for the capital and energy necessary to enable it to continue its forward movement in the path of progress and development.

All eyes were turned to the advent of a new President in the United States in anticipation of the impetus which it was expected would follow his assumption of office and the allaying of political rivalries. The shadow of prospective adverse mining legislation had passed, and that industry was again assuming some of its former activity, although capital was still timid and hesitating. How vitally the mining industry was affected by the two causes above indicated is shown by the statement made by President Diaz in his address to Congress in the spring of the year that "the first half of the fiscal year showed a diminution of 28 per cent. in the number of title deeds taken out, as compared with the corresponding period in the year previous." The severity of the strain in other branches of business is eloquently shown by the decrease in the country's foreign commerce. Imports decreased in the same half year 41 per cent., and exports fell off more than 14 per cent. A comparative statement showing the value of the imports and exports for the year 1907-1908 and 1908-1909 indicates how keenly the world's trade disturbance affected Mexico:

	1907-08.	1908-09.
	Value.	Value.
Imports .....	\$221,757,464	\$156,504,447
Exports .....	242,740,201	231,101,795

#### General Improvement in 1909.

As the year wore on trade showed marked improvement. The returning activity and renewal of confidence were not confined to any section or industry. So far as mining is concerned, capital appears to have overcome its fear, for from all the principal camps the reports indicate the existence of general activity, the installation of improved machinery and the adoption of more modern methods of mining and smelting. Tales of large properties to foreign capitalists are reported from time to time. From these reports the inference seems justifiable that the industry is again in a prosperous condition, notwithstanding the low price of silver and the tariff placed by the Payne law upon zinc ores.

Electric power is now being utilized in several of the principal mining camps. The modern scientific treatment of ores makes possible a profit in the manipulation of low grade minerals which in ancient and even in more modern times were regarded as of little or no value. Could the old Spanish pioneers revisit "the glimpses of the moon" and inspect the operations of their successors here they would be both amazed and instructed. Of the precious metals Mexico produced in 1907-8: Gold, \$38,096,661; silver, \$85,446,904. In the same year the values of other metals produced were as follows:

Copper metal.....	38,912,100	\$9,268,582
Copper ore.....	80,556,418	3,198,048
Lead metal.....	104,031,217	3,171,612
Lead ore.....	26,312	658
Zinc ore.....	43,339,938	444,237
Antimony metal.....	4,405,847	408,364
Antimony ore.....	364,284	11,000
Tin .....	4,291	3,000

In transportation, the Government has made further steps in the rounding out of its policy of controlling the country's railroad systems. In the month of

June all the details of the arrangements for the absorption of the Mexican Central and its branches were completed and the road ceased to be operated as an independent system. Soon afterward the Mexican Southern was also taken over by the National lines. The announcement was made early in the year that \$12,000,000 would be expended in the work of widening the gauge of the Interoceanic, one of the merged lines, and the physical betterment of the Central. The Southern Pacific line to the port of Mazatlan, on the Pacific Coast, was completed in April. Another interesting change in ownership of Mexican railroads is the recently reported purchase of the Pan-American Railroad by David B. Thompson, retiring Ambassador from the United States to Mexico. The road is some 500 km. in length, running from a point in the State of Oaxaca to the border of Guatemala. Despite the change of ownership, the track will, so it is affirmed, be extended to Panama.

The development of the country's petroleum resources has been actively pushed during the year. The so-called oil war between the Pearsons and the Waters-Pierce interests continues. A company capitalized at \$25,500,000 was formed in Mexico a few months ago to take over the English company's interests. The oil fields of Mexico Company, operating in the State of Vera Cruz, will soon complete the narrow gauge line of railroad from the gulf port of Tuxpan to the wells at Furbero, as well as a pipe line of large capacity. Several new companies backed by ample capital have also come into the field.

The rainy season this year was an exceptionally favorable one for agriculture. The crops are more abundant than they have been for five years, although a few days' severe frost did much damage in the higher altitudes in several States. Disastrous floods, with great loss of life, followed the rains, particularly in the districts of Monterey and Matamoros. In the former city the number of victims was so large as to place the disaster in the list of the world's great catastrophes.

Indications for 1910 are that the high prices which have ruled for cereals—upon which the great majority of the people depend for subsistence—will be materially lowered, and that the industrial interests of the country will enjoy a greater measure of prosperity than they have known since the depression caused by the panic of 1907 made itself felt here.

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**Heating and Melting Furnace Contracts.**—Among contracts Wm. Swindell & Brothers, Pittsburgh, have under way or are about completing are the following: Spang, Chalfant & Co., Pittsburgh, two large Swindell patent regenerative heating furnaces; Inland Steel Company, Indiana Harbor, Ind., eight Swindell combination sheet and pair furnaces and one Swindell patent regenerative heating furnace; Duquesne Steel Foundry Company, Kendall, Pa., one 8-ton open hearth steel melting furnace, one open top annealing furnace and one heating furnace; Fort Pitt Malleable Iron Company, McKees Rocks, Pa., 12 Swindell annealing furnaces, two Swindell 18-ton malleable open hearth melting furnaces, one 18-ton open hearth steel furnace; Ohio Seamless Tube Company, Shelby, Ohio, two Swindell regenerative heating furnaces, one hot saw heating furnace and six Swindell annealing furnaces; Carnegie Steel Company's Clairton Works, a battery of six Swindell water seal gas producers; Superior Steel Company, Carnegie, Pa., two Swindell patent annealing furnaces; National Roll & Foundry Company, Avonmore, Pa., one 15-ton air furnace; R. D. Nuttal Company, Pittsburgh, two heating furnaces; Firth-Sterling Steel Company, Uniontown, D. C., one soaking pit furnace and one crucible steel melting furnace; A. M. Byers Company, Pittsburgh, one regenerative socket furnace; Columbia Steel Company, Elyria, Ohio, one Swindell annealing furnace.

## STEEL AND CONCRETE.

Their Co-ordination in Reinforced Concrete Construction.

BY J. F. SPRINGER.

No one knows how long properly made concrete will last, but examples of it left by the Romans are still in good condition. It is capable of resisting very considerable compressive strains, is practically fireproof, is teredo proof, is probably not subject to appreciable deterioration when exposed to alternations of weather, if properly protected, and is, apparently, but little subject to chemical disintegration in water when it is properly made, but it has one conspicuous fault, weakness under tensile stresses. What concrete so evidently lacks, steel possesses, high tensile strength and ability to withstand transverse stress. One thing they have in common, and it is that that makes rein-

ing fresh concrete until it has set and preventing exterior material from intrusion upon the concrete while plastic. Use of steel for these auxiliary services is becoming more extensive, as concrete practice is fast becoming standardized in certain directions, making it possible to use the same forms repeatedly and so warranting a considerable first cost. Employing steel forms introduces another considerable use for steel in connection with the securing and handling of these forms. In addition, though indirect, may be mentioned the systems for the local handling of the concrete and its raw materials. Still further back, other large uses for steel and iron are in the preparation of the raw

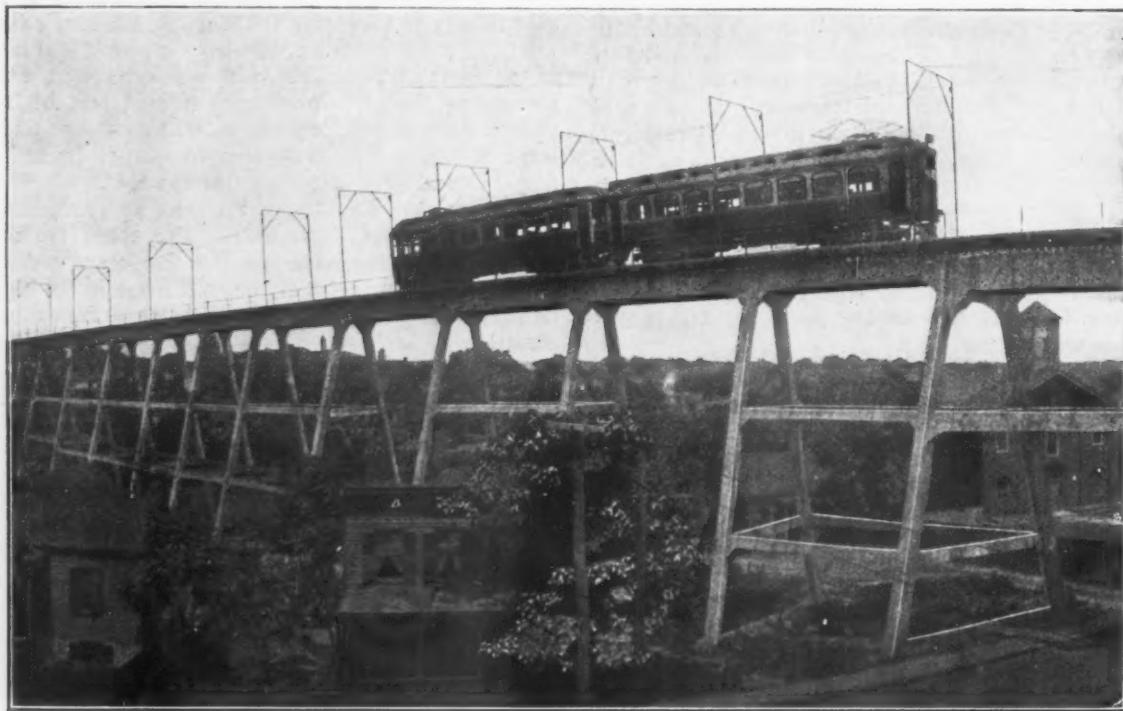


Fig. 1.—A Reinforced Concrete Viaduct at Richmond, Va., Built for the Richmond and Chesapeake Bay Railroad.

forced concrete valuable—they have substantially the same coefficient of expansion, hence their union is not destroyed by changes in temperature.

Steel itself is poorly resistive to corrosion, and is only partially fireproof, for while it is not easily burnt, moderately high temperatures will cause it to buckle and bend. Buried in concrete these deficiencies are offset. In many places steel alone would not serve to the best advantage, and the same may be said of concrete. A notable example of the advantage of the two combined was afforded by some recent improvements carried out in Baltimore. Three of six large docks had been constructed of wood and masonry, when it was realized that to use the same materials for the remaining three and the long bulkhead opposite one of them would be more expensive than concrete reinforced by steel. Steel alone would have been out of the question, because of corrosion, and all concrete on account of the amount of cement required. A retaining wall of concrete alone would have cost about \$600 per linear foot, whereas the reinforced concrete construction cost only about \$58 per linear foot.

Another use of steel in connection with concrete is in the forms employed for molding, both for retain-

materials, as in the machines for crushing the rock. Taken all in all, the use of steel and iron more or less necessarily involved in the engineering applications of concrete is now very large and becoming ever larger. While concrete may be replacing steel in certain lines of work, on the whole the two are not to be regarded as competitors whose interests are totally at variance with each other.

### Steel as Reinforcement.

A very considerable adhesion develops between concrete and imbedded steel, but if tensile strains are to be borne this alone cannot be relied on; a mechanical bond must be established to transfer all tension to the steel. This accounts for the more or less complicated forms of the standard types of reinforcement.

Concrete with reinforcement effecting a mechanical bond is admirable for factory construction. It is fireproof, long lived, practically unaffected by the weather, and suitable for rapid and economical erection. In the floors it does not splinter or become unsanitary by its retention of dirt. The interior of an all concrete building may be easily cleaned.

The large factory of the George N. Pierce Company

at Buffalo, N. Y., is an excellent example of rapid construction with concrete. Certain large buildings were wanted quickly and within seven months of the signing of the contract with the Trussed Concrete Steel Company, Detroit, Mich., using the Kahn system of reinforcement, they were completed. These buildings have a floor area of over 325,000 sq. ft. The great problem was meeting the requirements of large unbroken floor spaces. Very many girders having spans of 55 and 61 ft. were used, of reinforced concrete, depending for their strength upon the Kahn system. In the ordinary built-up truss the lower horizontal piece is the main tension member, and the diagonals extending from this upward toward the ends are also tension members. In the Kahn system this part of a truss is supplied in steel. The remainder of an ordinary truss consists of compression members. This service is performed by the concrete above and around the Kahn steel truss. The long girders were constructed in this manner. Other girders were required for runways for 3-ton cranes. Upon one having a span of 25 ft. a load of 14 tons was

per year in premiums over similar structures in the same locality.

Another fine example of reinforced concrete construction is the Richmond & Chesapeake Bay Railway viaduct at Richmond, Va., Fig. 1, which is over  $\frac{1}{2}$  mile long. One of the longest spans is 70 ft. The girders used are nearly 6 ft. deep and are reinforced with Kahn trussed bars. There are two 7-degree curves on the viaduct. At one of the spans—67.4 ft.—the great girders sagged but  $\frac{1}{8}$  in. when the false work was removed.

The Hennibique system, among others, meets the inability of concrete to stretch by using a longitudinal tension rod near the bottom and a second longitudinal rod just above the other at the center and rising into the body of the concrete toward the ends. A series of metal loops or stirrups at intervals envelop these two bars with their open ends up.

The great fire at Baltimore in February, 1904, afforded evidence of the ability of reinforced concrete flooring to preserve its strength. The United States

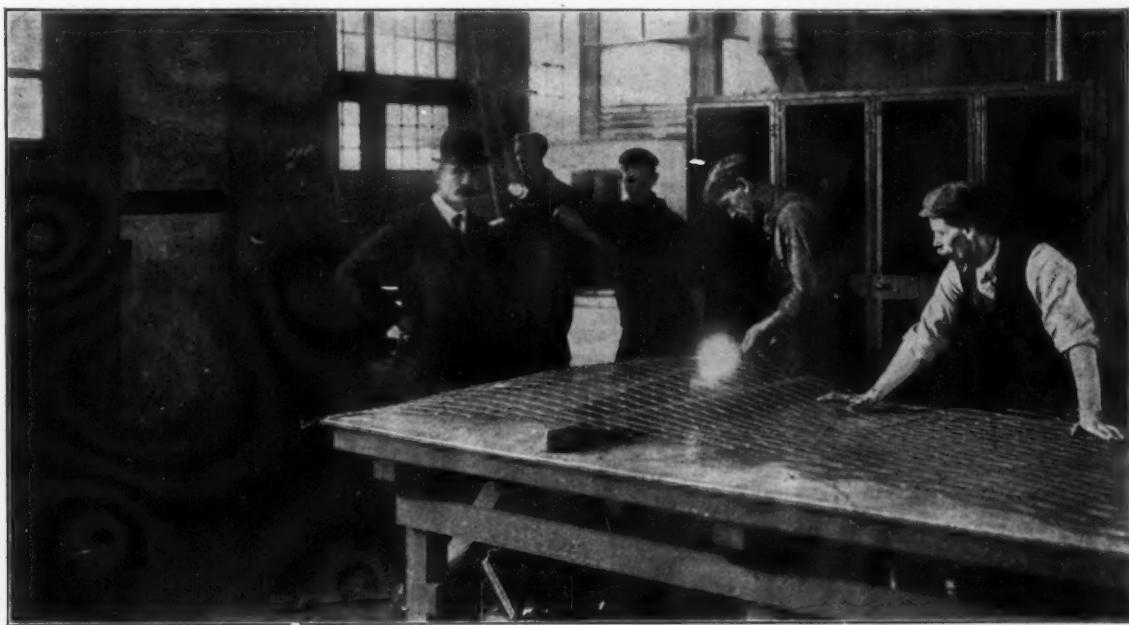


Fig. 2.—Repairing Breaks in Expanded Metal Concrete Reinforcement with a Davis-Bournonville Oxy-Acetylene Welding Torch.

placed and the deflection was only 1-16 in. This beam is 12 x 22 in. and is reinforced with three 1 x 3 in. Kahn bars. The roof construction was of hollow tile. Nearly everything was concrete or tile—roof, walls, floors, girders and pillars. This job required about 1500 carloads of material.

To preserve the imbedded steel from corrosion, it seems necessary to prevent the caustic lime in contact with the metal from being dissolved out by water. The most direct method is, perhaps, to make the concrete very dense. Other methods are to coat the surface with a bituminous or oleo-resinous paint to fill the pores, or to include in the materials a small amount of an insoluble substance adapted to fill the pores of the entire mass or merely the surface, or to employ a layer of flexible waterproof material.

Knowing approximately the strength of the steel used as reinforcement is important. For this reason the Kahn concern deprecates the use of high carbon steels because of the difficulty, as compared with mild steel, of obtaining it of a uniform strength.

#### Typical Application.

A notable concrete building is the Marlborough-Blenheim Hotel at Atlantic City, the footings, columns, floors, roof and beams of which have Kahn reinforcement, and hollow tiling was largely used. It is 560 ft. long and varies from 60 to 200 ft. wide, and is said to have been insured for \$600,000 at a saving of \$18,000

Fidelity & Guaranty Company's building was exposed to such intense heat that a large portion of the brick side walls and the front collapsed, leaving the concrete flooring exposed. Brick was piled on the floor over an area extending nearly 5 ft. on each side of a girder, giving a load averaging 300 lb. per square foot, and the deflection was only  $\frac{1}{8}$  in., or about 0.0005 of the span.

One of the commonly used forms of reinforcement is expanded metal. In the manufacture of this sheets of from 12 to 16 ft. long and 14 in. wide are perforated with numerous short slits and then in an expanding machine are stretched out to a width of some 4 or 5 ft. Often in this process some of the narrow separated sections of metal break, and formerly, when more than four or five breaks occurred, the whole piece was discarded. An interesting use of the oxy-acetylene welding torch has arisen in this connection for repairing such breaks. Fig. 2 shows an equipment of Davis-Bournonville apparatus in the shops of the Expanded Metal & Fire-proofing Company at Toronto, Canada. About 30 welds an hour can be made in reclaiming otherwise defective sections.

A highly important use of concrete is in sewer construction. Fig. 3 shows a concrete sewer under construction, reinforced with the Havemeyer steel bar. A closely allied use is for subways, where the same reason, the rapidity with which work can be executed, is an important factor. An instance of this was the

construction of the Hudson and Manhattan tunnel system connecting New York City with Jersey City and Hoboken. On the New Jersey side opposite the lower part of Manhattan the tubes were to have three junction points, where very decided enlargements in the subsurface construction would become necessary. To enable this work to be carried on it was decided to sink three separate caissons, and it was found that if constructed of reinforced concrete the work might be done very rapidly and economically. These concrete caissons were each about 100 ft. long, about 45 ft. wide and 44 to 51 ft. deep, to accommodate superimposed tubes, each tube having a single track. A view over the tops of the caissons is given in Fig. 4, for which we are indebted to the engineering firm of Jacobs & Davies. Concrete was also very extensively used in the tunnels themselves, in the approaches and in the foundations and other portions of the Terminal Buildings. Altogether, it is thought, some half million barrels will be required to complete the work. This is about one-fourth of the amount which will be needed for the Gatun Locks. In connection with the

one of the three arches has a span of 100 ft. The reinforcement is the corrugated steel bar, of which 130 tons were used. This type of construction gives a roadbed remarkably free from vibration and noise.

Also notable is the Maumee River bridge near Waterville, Ohio, built from designs of the National Bridge Company. The river at the site is about 1000 ft. wide. There are 12 arches of spans ranging from 75 to 90 ft. As a loaded arch adjacent to an unloaded one would exert a thrust against the pier common to the two, vertical rods were used in the piers. In the entire bridge 100 tons of reinforcement were used and 9200 cu. yd. of concrete. The bridge will safely carry 10,000 lb. per longitudinal foot. It is 16 ft. wide between copings, and cost entire about \$77,000.

#### Concrete Piling.

The use of concrete in bearing piles is comparatively new, but becoming very widespread. The wooden pile is subject to decay unless completely and continuously submerged, and in certain localities a prey to the teredo. The concrete pile, once in place

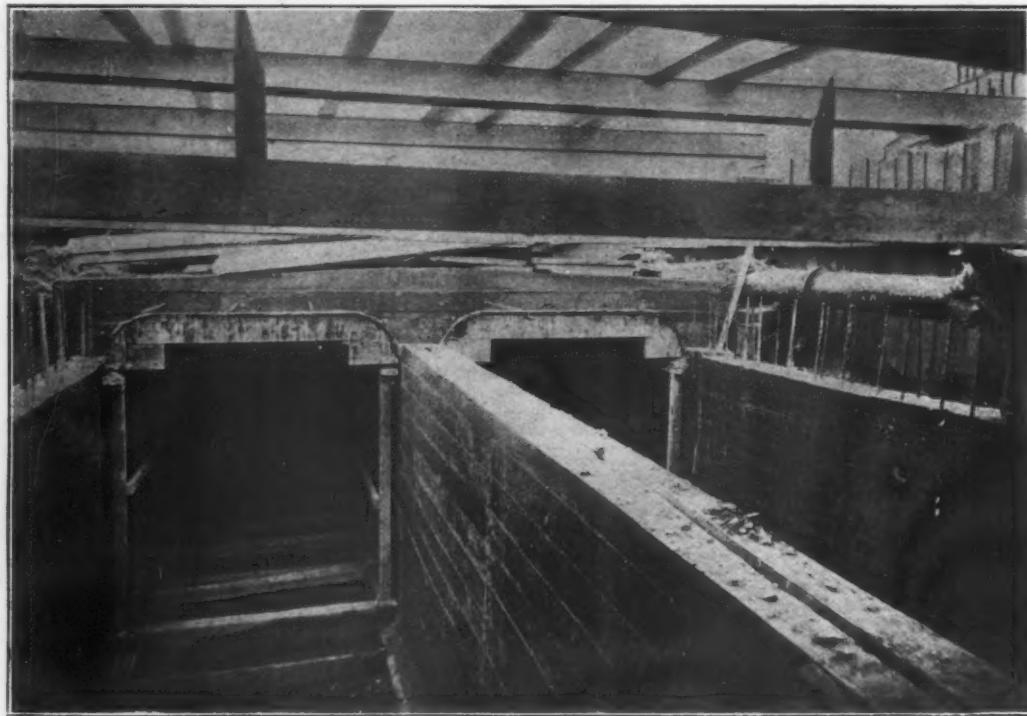


Fig. 3.—The Roxbury Sewer, Boston, Mass., Reinforced with Havemeyer Steel Bars.

terminal buildings alone, 60,000 cu. yd. of concrete have been consumed. This large amount was reinforced with 1000 tons of twisted steel bars.

#### Concrete Bridges.

One of the principal directions in which both mass concrete and reinforced concrete are advancing is in bridge work. Philadelphia is prominent in the construction of city bridges of concrete. About 30 have already been built, among which a good example is the Frankford avenue reinforced concrete bridge, crossing Poquessing Creek with a span of 71 ft. and a rise of only 9½ ft. The main reinforcement consists of steel ribs placed 4 ft. apart. These ribs are of latticed construction. Each rib consists of two arches, one above the other, which are nearer together at their summits than elsewhere. The arch strips are each composed of two angles backed against each other and thus forming a T. These two strips are latticed together and thus form a kind of truss. Transverse pieces of steel are incorporated in the body of concrete binding the whole together.

In Fig. 5 is an especially fine example of railroad bridge construction. This crosses the Salt Fork of the Vermillion River near Danville, Ill. The central

and thoroughly matured, is ideal. It is not attacked by the teredo, does not require unceasing submergence, and is fairly cheap. Where the concrete pile possesses a great advantage is in city construction where water-bearing strata are penetrated. The head of the wooden pile must be cut off below the water level, which necessitates carrying the foundation construction to the same depth. The concrete pile can be used not only for the subaqueous strata, but for those overlying as well, which often reduces the cost of the substructure considerably. The reinforcement of bearing piles does not appear to be vital, for their main office is to resist compression. However, some regard the reinforcement important to prevent buckling in soft strata and often concrete piles are both longitudinally and transversely reinforced. The Gilbreth patented corrugated pile is a typical form. It is cast and matured above ground and reinforced, as shown in Fig. 6. The longitudinals are bound together by hoops, and wooden forms may be seen enveloping the reinforcement. An axial perforation extends the entire length, and also external longitudinal corrugations. Other reasons for reinforcing concrete piles are that they are less likely to be broken in transporting and driving.

Sheet piling has been used, made of wood, cast

iron and steel, and lately concrete sheet piling. The sheet pile, unlike the bearing pile, supports no load, but does receive horizontal thrusts, hence it must be reinforced. The function of the concrete is to protect the steel and provide a surface. In the recent improvements on the water front in Baltimore, concrete sheeting was considerably used. The slabs were, ordinarily, 12 x 18 in., and were reinforced longitudinally and transversely with steel. Their duty was to retain a mass of earth partly submerged, and steel sheeting was precluded on account of exposure to rust. Taken in connection with the steel used for auxiliary concrete construction, the reinforcement employed at Baltimore in the construction of three docks and a long bulkhead amounted to 1200 tons.

#### Other Applications.

Usually concrete consists of cement, sand and stone in various proportions, and sometimes with a different third ingredient. A unique experiment was

boro, Mass., is 118 ft. high, and 50 ft. in diameter inside. At the top the wall is 8 in. thick and at the bottom 18 in. The concrete used was a 1:2:4 mixture. Water tanks and towers have been constructed entirely of reinforced concrete. One at Anaheim, Cal., has its floor at a level of about 60 ft. The joists of the floor, the uprights, the struts, the floor and the tank itself are of reinforced concrete. The tank is 38 ft. high and 30 ft. in diameter; at the floor the wall is 5 in. thick, and at the top only 3 in. It is reinforced with twisted bars.

#### Concrete Chimneys.

Concrete chimney construction is about 10 years old in the United States. Since 1898 about 400 have been built. Perhaps the tallest is that constructed for the Colusa Parrot Mining & Smelting Company, Butte, Mont. This chimney is now about four years old, is 352.5 ft. high and 18 ft. in diameter inside. For the first 21 ft. above ground the wall is solid and 18 in.

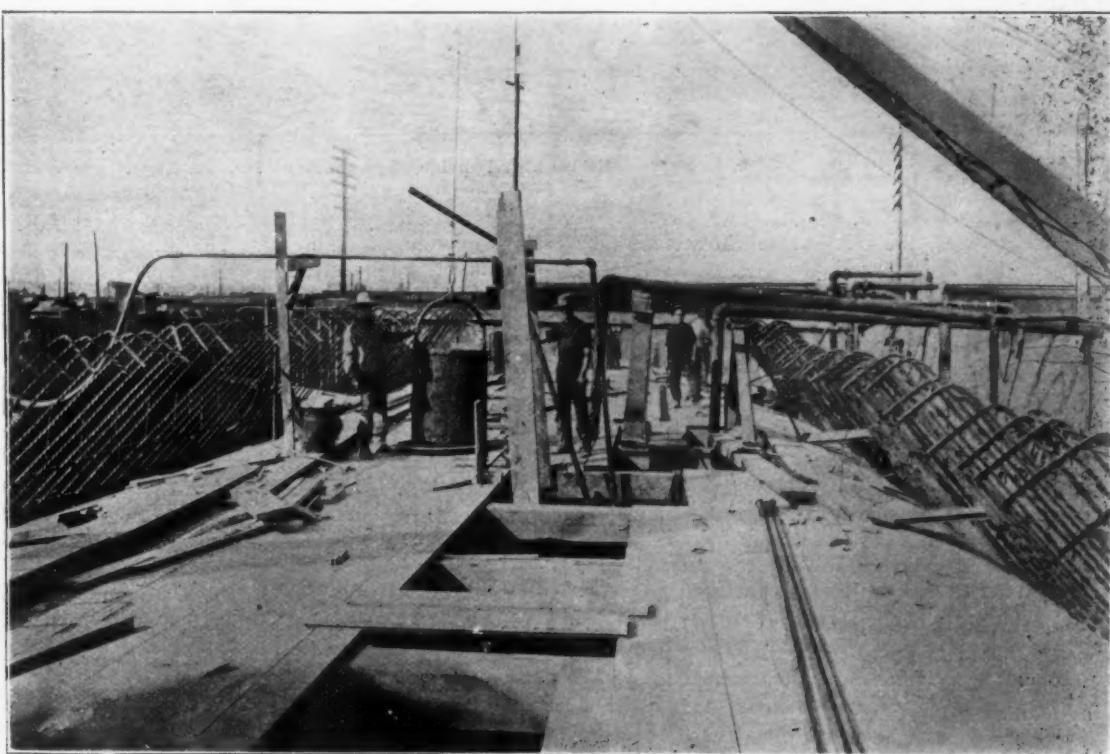


Fig. 4.—Use of Reinforced Concrete Caissons in Some of the Hudson Tunnel Work.

made recently by L. S. Moisseiff, an engineer in the Department of Bridges, New York City, by replacing stone with wire nails or other small pieces of metal, to give a material readily molded initially and highly incompressible as well as indestructible in a short time. The material was used to fill spaces in a large casting which was to become the pedestal of a bridge. Nearly all the 60 tests were made of a 1:2:2 2-3 concrete. The specific gravity was high, a cubic foot weighing 196 lb., against the usual weight of about 130 to 160 lb. The cost was high, 88 lb. of nails being used in a cubic foot, and was about \$62 per cubic yard, but the circumstances warranted this cost. Cubes 6 in. on a side were tested to destruction. When seven days old, the minimum crushing resistance developed was 2770 lb. per square inch, and the maximum 3330 lb.; in a month the minimum resistance was 3050 lb. and the maximum 8340, the average being 5645 lb. Four cubes one year old developed an average resistance of 10,410 lb., but most remarkable was the average resistance of 17,235 lb. developed after 15 months.

Concrete is now being applied to the construction of water tanks, and here especially reinforcement is necessary. Two quite notable ones have been constructed. One is 110 ft. high and about 35 ft. in external diameter. A still larger standpipe, at Attle-

thick. Above it consists of two concentric shells, the outer one 9 in. thick and the inner one 5 in., leaving a 4-in. air space between. The reinforcement consists of T bars. The reinforced concrete footing was placed upon a fill 18 ft. deep consisting of molten slag in which were placed steel wire rope, chain and T rails.

One of the serious factors to be considered in chimney construction is the effect of repetition of stress, hence a large factor of safety is recommended, and also on account of the stresses set up by extreme expansion and contraction, for while for moderate changes of temperature the coefficients of expansion for concrete and steel may be taken as equal it is not safe to do so for large ones. It is usual to arrange an inner shell separated from an outer one by an insulating space of air, this double construction being carried about one-third of the way up; but chimneys sometimes crack above this height, so that it has been thought the double construction should be extended higher or so to place and reinforce the concrete as to take care of the high temperatures at the upper elevations. In any case, the best practice is undoubtedly to make two entirely independent shells, so that there shall not be such great thermal variations in the same monolithic mass. The wall thickness should be kept uniform to avoid introducing stresses which cannot be

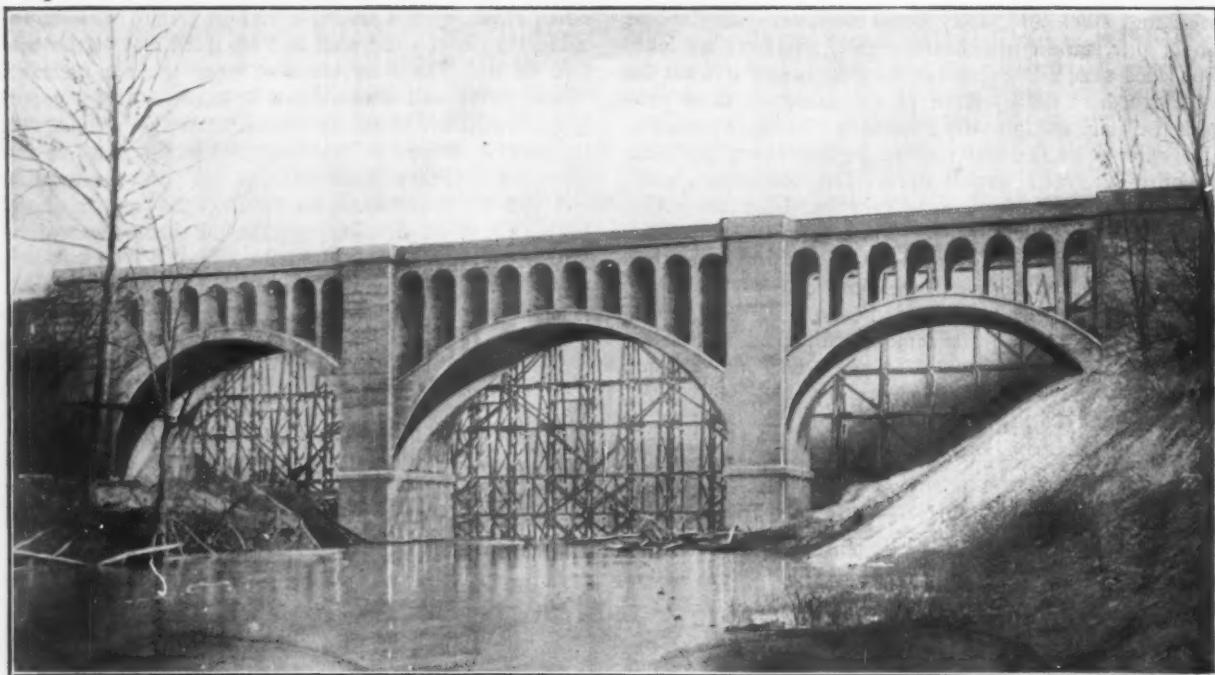


Fig. 5.—Reinforced Concrete Railroad Bridge Near Danville, Ill., Over the Vermillion River.

calculated. To avoid vertical cracks which have developed in certain cases, the circular reinforcement may be increased. For the outer shell a true concrete having the proportions given by the formula, 1:2:2, is better than the usual cement mortar. It is a stronger, denser and more watertight material than a 1:3 cement mortar. Past failures are attributed largely to the use of dry concrete. The concrete should be wet, as otherwise its adhesion to the steel will be reduced and also its union with the preceding layer.

**Marine Construction.**

Perhaps the most radical use of reinforced concrete is in boat construction. As far back as 1897 a kind of houseboat was built largely of reinforced concrete, for use by the Rome Rowing Club on the Tiber in Italy. The hull consisted of reinforced concrete pontoons. Of the superstructure, the posts and roof were of the

same material. This floating stone structure was 67 ft. long and 21 ft. beam. The Liguria is a shapely reinforced concrete barge 57 ft. long and 18 ft. beam, of 150 tons, and is in practical service near Rome. In the United States, not much has been done along this line, although the Gretchen, a reinforced concrete yacht, was built at about the same time as the house-boat for the Rome Rowing Club. This yacht has been out on the Atlantic and seems to have sailed over a range of a score of degrees latitude or more. It drew 14 ft. of water, had a length of 65 ft. and a beam of 16 ft. A great number of small steel rods were used for reinforcement. It was said to be comparatively fast in heavy weather.

The object in many applications of steel reinforcement is to reduce the weight of concrete needed. To an extent this object is accomplished by using what

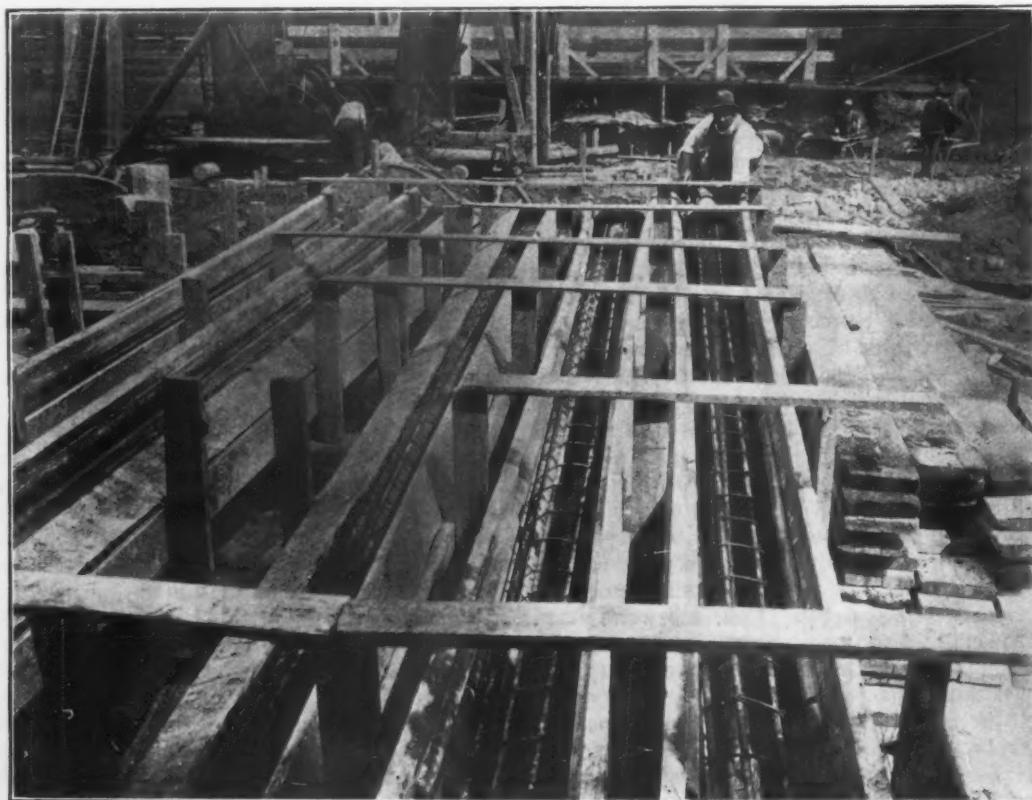


Fig. 6.—Molds for Gilbreth Reinforced Concrete Piles.

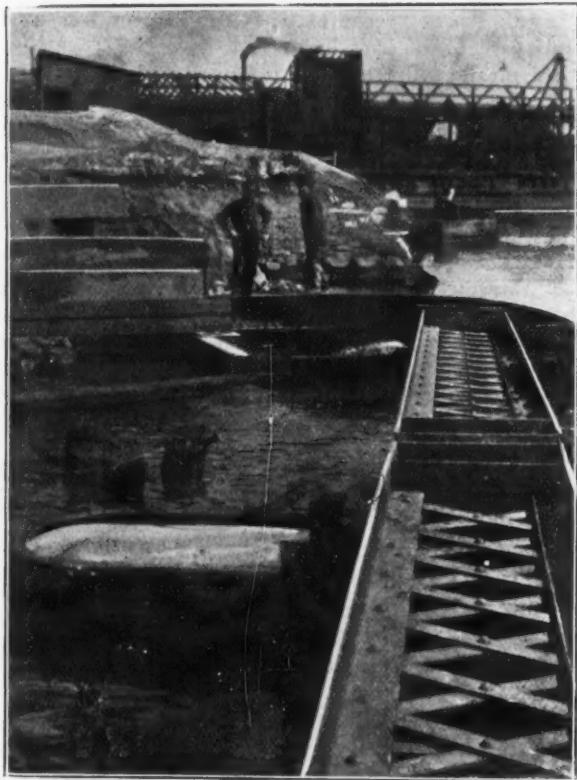


Fig. 7.—Steel Girders for Baltimore Docks, Later Inclosed in Concrete, Ends Resting on a Completed Concrete Pier.

are called pudding stones. At McCall's Ferry on the Susquehanna River, a power plant is being constructed to utilize a comparatively low head of water and produce a large output. Plenty of water is available, but it was necessary to build a dam 2500 ft. long, extending nearly the width of the river. The remaining distance will be occupied by the power house. Both are of concrete. No reinforcement was used in the dam, but pudding stones somewhat reduced the expense of concrete. While not used in the body of the concrete, steel found important application in auxiliary ways. The downstream face of the dam has an ogee curve, to mold which I-beam steel ribs were used as a framework for the molding surface. Large steel pelican cranes were used to handle the concrete. The dam was built mainly in sections 40 ft. long, alternating with open spaces of the same length. To shut out the water from these open spaces, a steel apron 44 ft. wide was dropped on the upstream face, when the concrete could be laid in the dry.

#### Concrete for Fireproof Construction.

Two new grain elevators have been built at Baltimore, one by the Pennsylvania Railroad Company, and one by the Baltimore & Ohio Railroad Company, and a third at Buffalo by the Husted Milling Company, all of reinforced concrete. One replaces a frame structure destroyed by fire. The largest, that of the Pennsylvania Railroad Company, has over 1,000,000 bushels capacity in 53 reinforced concrete bins, each 79 ft. high; 32 have an inside diameter of 24.2 ft., and are arranged in four rows of eight each. The 21 spaces between them are occupied by smaller bins. Above and below the bins are conveyor-houses which bring the height of the entire structure up to 111 ft. The 8-in. walls of the bins are reinforced vertically by 1-in. and  $\frac{3}{8}$ -in. round bars and horizontally by flat bars, interlaced with the vertical bars. In casting the bins, a patented style of form was used to mold a short vertical section at a time, being shifted after the setting of each one, to the next higher position by jacks attached to the 1-in. vertical reinforcement.

#### Reinforced Concrete for Wood Protection.

The United Fruit Company of Boston operates in the Republic of Panama not far from the Panama Canal. At Bocas del Toro a large reinforced concrete wharf has been constructed, itself a good example of the use of this material, but particularly interesting are the bearing piles. Because of the ravages of the teredo, the ordinary native wooden piling would become unserviceable in less than a year. Certain species of wood would last somewhat longer, but even creosoted piles could be relied on for not more than about 15 years. A further difficulty was that piles as long as 70 ft. would be needed, which precluded reinforced concrete alone. As a compromise the pile proper was untreated timber encased from a little below water bottom to well above the surface with a reinforced concrete shell with a space between. Within this space rich concrete was placed at the bottom forming a seal, then the water was pumped out, lean concrete put in, and finally another section of rich concrete in which the column reinforcement was placed. The reinforcement used on the structure, 250,000 lb., was mainly round mild steel bars. The shells averaged nearly 18.4 ft. long and cost \$1.78 per longitudinal foot. The average pile was 58 ft. long. The untreated pile plus the shell cost no more than a creosoted pile.

#### More Marine Construction.

The municipal improvements at Baltimore previously mentioned constitute an important and recent application

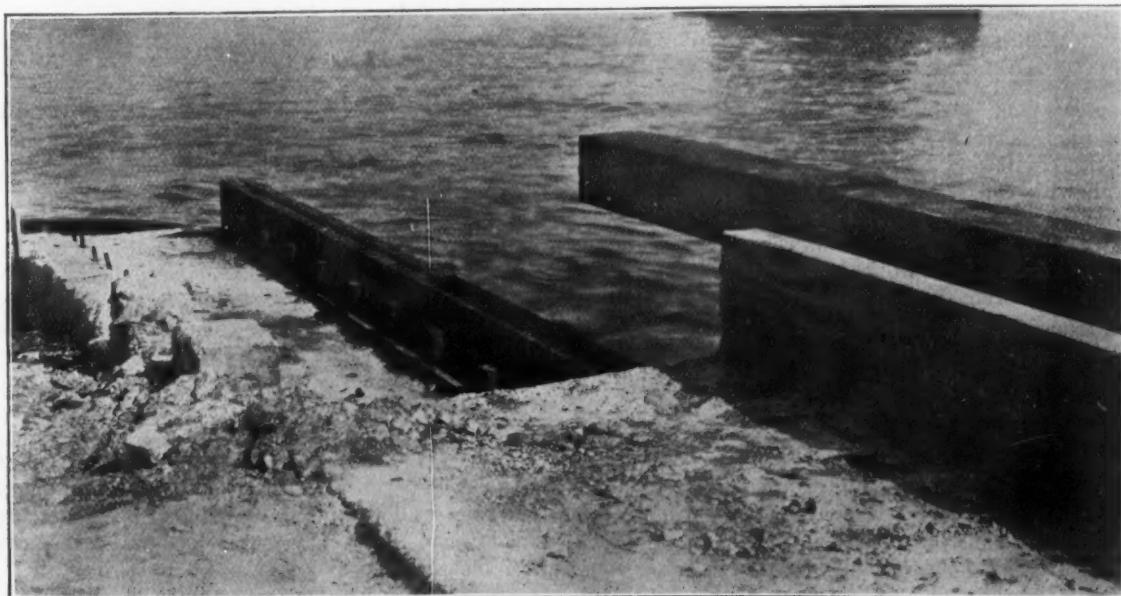


Fig. 8.—Steel Reinforcement for Other Concrete Girders in the Baltimore Docks.

of reinforced concrete in sheet-piles, wales, girders and anchor piles. The sheet-piles to retain the earthen embankment were as a rule 12 in. thick with a face of 18 in. and averaged 27 ft. long. These were non-interlocking, a perfectly unbroken wall being unnecessary. At their upper ends they were connected by concrete wales reinforced by lattice girders. In Fig. 7 two of these steel girders are seen in position before applying their concrete envelope, which is practically only a protective covering, and one of the concrete supporting piers. The latter were cast in hollow steel cofferdams or cassions, 27 ft. deep, and have an upward projection at one end against which the wales bear. Some are tied together in pairs from side to side of the dock, and others are tied back to anchor piles. These ties and anchor piles are also reinforced concrete. Fig. 8

storms. About 5700 tons of reinforcement was used, and over 250,000 barrels of cement.

Typical of the means of founding the piers was the construction of those for the viaduct extending from Long Key for 2 miles through water varying from 13 to 20 ft. deep. First, about 28 piles were driven into the coral of the sea floor. Then, from a large catamaran a cofferdam was let down inclosing them, and when sufficiently well seated, 3 ft. of concrete was deposited inside. After this had hardened the water was pumped out and the form containing the steel reinforcing rods properly wired was filled with concrete and left for about three weeks. The fresh water was used to mix the concrete because of the effect of salt water on the reinforcement. The concreting was finally carried on up and connection



Fig. 9.—Pouring the Concrete.

Molding Concrete Telegraph Poles in Position as Done by the American Concrete Pole Company, Richmond, Ind.

is a view from above one of the Baltimore piers during construction. Prominently in view are two channels connected by woven wire, before being covered with concrete. The concrete wheel guard is seen to the right. Beyond it is a wooden beam designed to act as a buffer. This is carried by fender piles of wood. This work was carried out by the Raymond Concrete Pile Company.

An example of the use of concrete for marine construction in an exposed situation is the connection of the string of small islands from the mainland of southern Florida and Key West, 156 miles, for a railway line. About half the distance is land, and the intervening straits, which vary in width from several hundred feet to about  $2\frac{1}{2}$  miles, are mainly shallow, but for about 6 miles the water is comparatively deep (up to 30 ft.) and the situation very much exposed. Here reinforced concrete viaducts have been constructed which have not merely to carry trains, but to resist the heavy seas during the severe sub-tropic

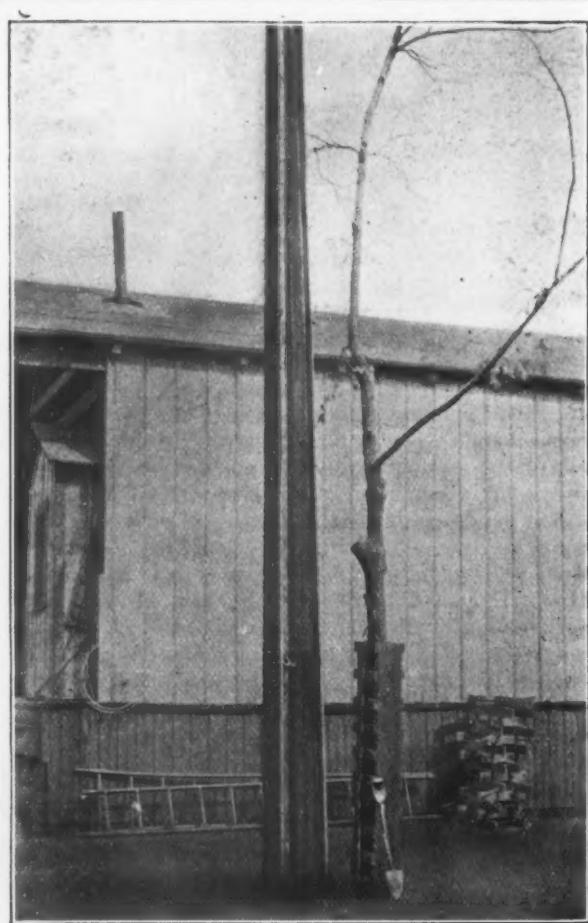


Fig. 10.—Face of Form Removed.

made between piers. The 184 arches and walls were reinforced with corrugated bars. The top of the viaduct is 31 ft. above high water to put the track out of reach of the waves.

#### Concrete Telegraph Poles.

The extension of telegraph and telephone service and renewal of old poles demands an enormous amount of expensive timber; \$13,000,000 is spent in the United States yearly for renewals. The concrete pole is attractive because of its very long life and the little care it requires. The strain it must endure is severe, including not only load, but transverse wind pressure against the pole, arms and wires. Only through steel reinforcement can resistance to bending be secured.

From experiments so far made it is recommended that poles no longer than 35 ft. be cast in a horizontal position and then set, and that longer poles be cast in position. Figs. 9 and 10 show a pole so made. The molds may be made of wood or iron. The form is that of a square, tapered shaft beveled on the corners.

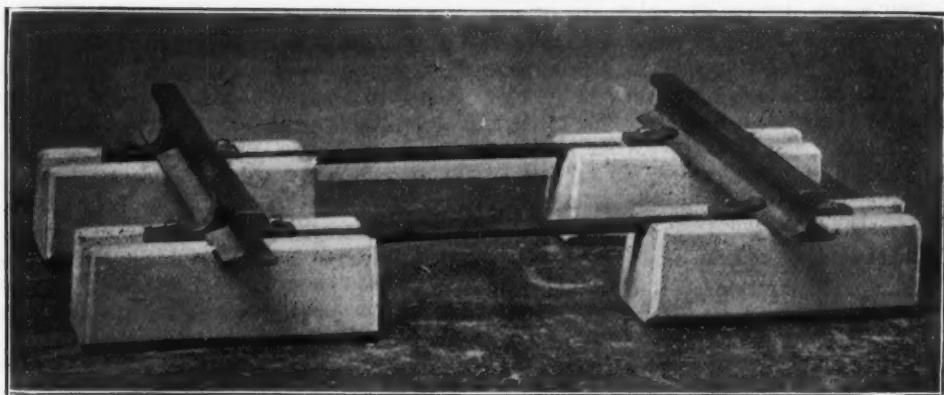


Fig. 11.—Model of the Corell Steel and Concrete Railroad Tie.

Four upright steel rods in the corners secured together by binding wire form the reinforcement. Such poles, erected, cost little more than cedar poles and last indefinitely.

One of these poles, tested to destruction, was 7 in. square at the top and 12 in. at the ground, 30 ft. long and planted 5 ft. deep, and was reinforced by  $\frac{5}{8}$ -in. steel rods bound together with No. 9 wire. A pull of 840 lb. at the top deflected it 6 in.; 1780 lb., 17 in.; 2800 lb., 30 in. (slight cracking); 3640 lb., 36 in. (cracking at the ground line), and 7200 lb., 60 in. (bad cracking at the ground line). A pull of 840 lb. on a cedar pole of the same size deflected it 11 in.; 1780 lb., 33 in., and 2200 lb. broke the pole about a yard from the ground. The type of pole and reinforcement referred to above are those of the American Concrete Pole Company, Richmond, Ind.

#### Concrete Railroad Ties.

The increasing cost of wood alone would make the railroads welcome a cheaper substitute for wood ties. If the load were quiet and its nature clearly foreseen, plain concrete supports would suffice. A sudden heavy moving load at each end of a concrete slab tends to break it in the center, and probably also elsewhere, due to rocking effect, so there must be reinforcement. To eliminate center, binding the Corell patented tie is cut in two, as shown in Fig. 11, as it appears in the track before ballasting. A piece of steel connects the two parts and by clips holds the rails to gauge. Another method of dealing with center binding is employed in

the Pervical ties which have an oval cross section in the vicinity of the rail, where the bearing is about 5 in., but at the center a close approximation to V-shape. Thus the reaction against the base of the tie is much reduced for a distance of perhaps 2 ft. Four corrugated steel bars form the longitudinal reinforcement and are bound together with wire. Three are  $\frac{1}{2}$ -in. bars and are placed near the top; the remaining bar,  $\frac{3}{4}$ -in., lies near the bottom. The rails are secured to the ties by screw spikes and metallic sockets. Between the rail and concrete is a cushion of hard wood. Three years ago, 100 of these ties were placed in a track in Texas where they would be exposed to severe service, and last June only seven were found defective, and these lay between wooden ties, which, by their deterioration, probably threw undue burden upon the concrete ties.

#### Concrete Coal Pockets.

One of the largest reinforced concrete coal pockets has a capacity of 10,000 tons and was built for the Lehigh & Wilkes-Barre Coal Company at Charlestown, Mass. The pocket which it replaces had been costing about \$1000 annually for maintenance. The concrete pocket is 182 ft. long, 92 ft. wide and 24 ft. deep. The foundation is 750 Simplex concrete piles. Wooden piling would have been more expensive, perhaps not so satisfactory, and would have had to be cut off 10 ft. below the surface to conform to the building laws, entailing a great amount of excavation. As even then but 10 tons could be carried on each pile, 2000 or more

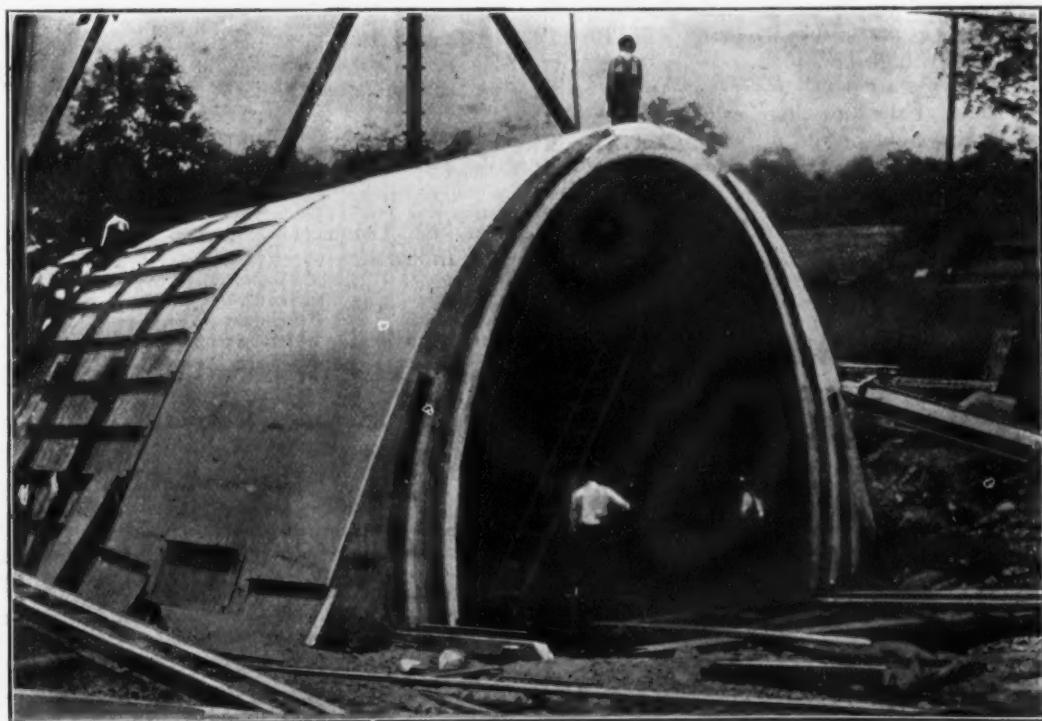


Fig. 12.—First Section of the Catskill Aqueduct, Formed on Blaw Collapsible Steel Centering.

would have been required. Concrete piles could be brought to the surface and the footings for the columns constructed with little excavation. Upon these concrete footings the columns to carry the storage bins were constructed of reinforced concrete. The girders, beams, floor slabs, side walls and all except the roof were also reinforced concrete. The weight of coal on the floor, when the pocket is full, would be approximately 2 tons per square foot.

#### Steel Forms for Concrete.

A notable instance of the use of steel in concrete construction for other than reinforcement is had at Panama. It was stated in the author's article dealing with the canal in *The Iron Age*, July 1, 1908, that about 2,000,000 cu. yd. of concrete would be required in building the three pairs of locks at Gatun. Each of the six locks is 110 ft. wide inside, and long enough to receive a vessel 1000 ft. long. The three pairs will lie at three levels and afford a double line of passage from the 85-ft. elevation of the level of Lake Gatun to the Atlantic Ocean level. A center wall 60 ft. wide will divide the two tandem series. It will not be solid, because the horizontal thrust of water in the locks diminishes toward the top. In the upper part of this wall will be a V-shaped fill, perforated longitudinally by three galleries, one for the attendants, one for electric wires and one for drainage. A supply culvert for the water to fill the locks will be made in the body of the concrete below the bottom of the fill, 22 ft. in diameter part way and 18 ft. the rest. At intervals two downward turns will connect with a transverse culvert below the lock floor, which through vertical wells will connect with the lock chamber. Thus the main culvert in the central wall will connect on each side with the lock chambers. On the whole the locks are to be of mass concrete and the use of steel for reinforcement is insignificant, but the complicated system of supply culverts are to be molded by steel forms. Twelve forms of open hearth boiler steel will be used for the main supply culvert, each 12 ft. long and weighing 177,000 lb. For the transverse culverts 100 forms are to be used, each 10 ft. long and weighing 217,000 lb. Within each of the two side walls of the cluster of locks will run a large outlet culvert of about the same size as the one in the middle wall, for which 21 forms will be used, each 12 ft. long and weighing 300,000 lb. These 133 forms will weigh 15,000 tons. The lock chambers are mostly of plain formation, with vertical side walls about 81 ft. high. To support the concrete from the inside while it is being placed 12 sheet steel face plates will be used, 7½ in. thick, 78 ft. high and 36 ft. wide. To support and handle each plate a steel tower will travel on a track on the floor of the lock chamber close to the side wall. The total weight of the towers and plates will be some 26,352 tons. Altogether then more than 41,000 tons of steel will be required. The concrete will be cast in great monoliths. For the ends of these, steel girders 6 ft. high will be used. If stone masonry were being employed relatively little steel would be needed. Here, then, instead of displacing steel, concrete has created a very large use for it.

#### Concrete Sewers.

In sewer construction concrete may be used in mass or reinforced, but with either, steel forms figure. The use of steel centering is fast becoming standard practice. A prominent system is that of the Blaw Collapsible Steel Centering Company, which was used at Baltimore for over three miles of concrete sewer. In constructing a part 11 ft. high and 12½ ft. wide inside centering could be used in 50-ft. lengths. Such a section with its falsework could be moved ahead to its next position in 2 hours by six men. Steel forms give a smoother surface to the concrete than wood forms, and, according to the superintendent of construction, where a two-mile length of sewer was put in, cost only about one-third as much.

The construction and mode of using a typical half-round center is interesting. The molding form itself consists of one or more plates forming a semi-cylindrical shell, held to shape by a series of turnbuckles arranged as diameters. This centering may be employed as the interior mold for either the top or bottom of a sewer. The trench is supposed to be excavated and maintained to form, and if the soil is suitable, no artificial means may be necessary; otherwise, the sides may be kept from collapse by using steel sheet-piles. With the trench in condition, a strip of concrete is laid along the longitudinal center line of the bottom. This may have its upper surface formed in a slight groove.

In Fig. 12 is an example of large construction where the Blaw system is employed. This is a part of the Catskill Aqueduct, which is to contribute to the water supply of New York City. On the front edge are seen the grooves which afford a mechanical joint with the next section. The plates used to give form to the outer surface are partly removed; some are yet in place at the rear and several may be seen lying at the bottom.

The considerable use of reinforced concrete belongs to the present generation, but the Portland cement industry is older. So far as the United States is concerned, it began about 1870. In 1880, the total output was 42,000 bbl. It would take over half a century at this rate to produce sufficient for the Gatun Locks. For the concrete of the tubes, buildings and approaches of the construction being completed by the Hudson Companies, the output of ten or twelve such years would be required. But from 1880 the production has steadily increased; in 1908 it was more than 1200 times that of 1880. The price, with some fluctuations, has declined from \$3 per barrel for the period 1870-1880, to 85 cents for 1908. The total annual value of the output for the average of the three years 1906-1908 was about \$50,000,000.

#### Chairman Gary on the Outlook for 1910.

In response to a request for a statement on iron and steel trade conditions at the opening of the new year Judge Elbert H. Gary, chairman of the United States Steel Corporation, gave out the following, which was published January 1. It is marked by conservatism and a recognition of the extent to which continued prosperity in the iron trade is dependent upon wise counsels at the seats of government—national and State:

So far as relates to the iron and steel industry of this country at present, there is little need for an elaborate statement. The figures which are given out from time to time speak for themselves. For the past eight months the new orders received by the subsidiary companies of the United States Steel Corporation have been gratifying. During December the bookings have been about 50,000 tons per day, while their capacity is about 41,000 tons per day. The only concern at the mills is to satisfy customers in regard to deliveries. Unlike former periods there has of late been little, if any, business taken for speculative purposes; on the contrary, the specifications for prompt delivery are more pronounced than ever before.

There is nothing in sight to indicate there will be any great reduction in the iron and steel trade for the year 1910. Most of the manufacturers have orders which will fully occupy their mills far into the future, and the new business from day to day, which continues active and large, will soon fill the books for the entire year. Of course, there are always possible dangers ahead, such as unjust and unreasonable legislation or inconsiderate action by public officials, which tend to create distrust and thus postpone commitments for further extensions. Or, what is more probable, there may be overconfidence, overextension, too rapidly rising prices, or other mistakes by those who are in charge of important affairs.

The lawmakers, the administrators of the law, and the active business and financial members of the community are all interested in working together to improve the material as well as the moral conditions of the people, and this will be of great benefit. We have all learned something by experience the past few years. I think there is no one more desirous of maintaining prosperity, so far as the same is consistent with good government, than the President himself.

## New Publications.

**Producer Gas Fired Furnaces.** By Oskar Nagel, Ph.D. Size, 6 x 9 in.; pages, 192; illustrations, 237. Bound in cloth. Price, \$2. Published by the author, P. O. box 385, New York City.

The constantly increasing use of producer gas as an industrial fuel marks progress both in economy and hygienes. The possibility of obtaining more work from a ton of coal when transformed into gas than when fired directly in a furnace and the replacing of high grade coals by low grade fuels, together with the smokeless combustion of the gas, constitute the principal advantages.

Suitable construction of the furnaces is of the greatest importance for the satisfactory application of producer gas. The main object of the book, which is the first American work on this subject, is to give detailed descriptions and practical illustrations of nearly all types of gas-fired furnaces, and with that end in view actual installations of the furnaces used in the chemical, metallurgical, lime, cement, glass, brick and ceramic industries are illustrated and described. The combustion of producer gas and the construction of producers are treated in detail.

**Business Administration.** By Carl G. Parsons. Cloth bound. 232 pages, 6 x 9 in. Illustrated. Price, \$3. Published by the System Company, Chicago and New York.

Many books have been written upon the principles of business and a number of others have been devoted to specific details of management, but this book is probably the first to combine and strike a medium between the two by covering in one volume the fields of business principles and operating methods. The present tendency toward analysis in all departments of industry has made such a work possible. Any business may be separated into the different departments and these in turn are capable of further subdivision and analysis until each part is shown clearly as related to the others and to the whole. This has resulted in the establishment of specific methods for handling the routine business of each branch.

"Business Administration" is unique, inasmuch as it maps out for the first time the entire commercial field. The basic principles of each branch of business are laid down and this exposition supplemented by a specific presentation of the actual operating methods. In a clear descriptive style the essentials of business are covered, such as the organization of a business with the advantages of the various forms, the reins of oversight and control, the requirements of record keeping, the computation and checking of production costs, the essential processes by which raw material is transformed into the finished product and sold, and the whole selling question with its ramifications of advertising, traveling salesmen, mail order methods and retail trade.

This book is based upon a series of lectures delivered by the author in the course on commerce and business management at the University of Michigan, and this material has been rewritten by the editorial staff of *System* and new matter added to bring it up to date and have it cover the whole field of business. In this work the staff has studied the operating systems and methods of management of a large number of businesses and the experiences of numerous contributors to that publication have been drawn on to insure the accuracy and practicability of the principles and methods described. New charts and forms showing the most modern methods and recent improvements in organization and system were prepared.

In this way a book that is useful both in the office and the classroom as a business guide and a text book has been obtained. It offers a complete exposition of

business principles to the student and the beginner in business and to the business man it affords an analysis of every department of his work and suggests better methods as a way to better results.

**Business Prospects Year Book, 1910.** Edited by Joseph Davies and C. P. Hailey. Cloth bound; pages 256, 4 1/2 x 7 1/2 in. Published by Business Statistics Publishing Company, Ltd., Cardiff, Wales. Price, 5 shillings.

This is the fourth annual issue of this book, which in part seems to fill the place once occupied in the United States by "Benner's Prophecies." The editors have set out to indicate "what will happen to coal, iron, copper, tin, shipping, cotton, wheat, hog products, dairy produce, tin plates, English 'rails,' American 'rails,' and the money market." They consider that their predictions for 1909 were fulfilled, and forthwith proceed to indicate in a general way what will be the character of trade and industry next year. Concerning the iron and steel trades the following is said: "Demand will be greater than in 1908 and 1909. The capacity of output will, however, still exceed the demand. Little change will take place in wages, but work will be more regular. Prices will range near the figures now (October, 1909) current. Average prices over 1910 will be higher than those of 1909."

In iron and steel, Great Britain, France and Germany, which produce 80 per cent. of the pig iron output of Europe, are chiefly dealt with. The influence in international trade of the iron industry of the United States is not considered important, since only 4 per cent. of the iron and steel production of the United States finds its way to international markets. Some attention is given to conditions in the United States, however, in the discussion of the prospects for American railroad stocks. On these the predictions are that in 1910 "the gross and net earnings will be the highest on record; dividends on the common stocks of the large railroads will be increased; stock values will again move upward and reach figures higher than those touched in 1909."

Valuable statistical and other data are given in the chapters devoted to the various metals. The predicted pig iron output in the United States in 1909, 23,000,000 tons, is about two and three-quarter millions under the output now indicated. Concerning copper prospects for 1910, the following is offered: "Production will be the highest on record. Demand will show expansion and stocks will be considerably reduced. Copper prices will rise and show a higher average than in 1908 or 1909. Copper shares will improve in value." These predictions appear to be safe, even though they are not as definite as some investors and consumers might wish.

**Books on Electricity.**—The D. Van Nostrand Company, 23 Murray street, New York City, has just issued Part II. of the general catalogue of scientific books, which lists all the books on electricity published by this firm and classifies them by subjects. It is 6 x 9 in. and contains 64 pages. An alphabetically arranged list of contents is given on the front cover, so that any one of the 41 different classifications can be easily found. Under each classification are listed all the books on any particular subject, such as storage batteries, dynamo electric machinery, telephones, telegraphs and calculations, &c.

The third edition of "Methods of Chemical Analysis and Foundry Chemistry," by Frank L. Crobaugh, analytical and consulting chemist and metallurgist, Cleveland, Ohio, will shortly be issued by the Brooks Company of the same city. The book has been improved somewhat, and will be offered for sale by the author and book sellers at large.

# THE IRON AGE

Established in 1855.

New York, Thursday, January 6, 1910.

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## New Competition in Finished Steel.

It has been accepted almost as a truism in these recent years of industrious absorption of iron ore properties by large interests that the lines of steel manufacture may be considered determined for many years to come. In other words, it is agreed that entirely new interests need not be expected to enter the steel industry in any important way. This means that the chief changes in the competitive line-up will come from the entrance of long established companies upon lines of manufacture which previously they had left to others. Now that machinery for the maintenance of iron and steel prices has passed out of use, these changes involve interesting possibilities. That the heads of the large steel companies are alive to them is already evident.

Rails were at one time the product most frequently involved in the threat of new competition. A Pittsburgh steel interest has often been named as about to become a maker of rails, and a Youngstown steel plant actively entered the rail lists a few years ago, only to turn soon after to semifinished products offering greater certainty of steady employment. The Bethlehem Steel Company re-entered the rail trade in 1907, but in the same year the Steel Corporation acquired the Alabama rail mill, and thus the number of rail producers remains the same. The small number of rail mills makes the maintenance of prices by lawful means a comparatively easy matter, yet it has been evident for some time that there is an oversupply of rail capacity in the United States, and the indications are that some well-known rail mills must be adapted to the economical production of other forms of steel for a greater or less part of each year.

Plates and structural shapes have not proved attractive lines for new competition. In eastern Pennsylvania the plate trade has for years been largely in the hands of long established firms. By excellent management and an adaptation of product to the requirements of particular lines they have maintained a unique position in the face of competition of interests farther West owning their own ore and fuel. In the past 15 years the chief changes in the plate trade, apart from increases at intervals in the capacity of companies previously engaged in it, have been the building of a mill in the Chicago District, the abandonment of plate manufacture at South Bethlehem, Pa.,

and the entrance into the business (though only on a moderate scale) of a steel company in western Pennsylvania, one in Pittsburgh, one in the Wheeling District and one at Buffalo. At times plate capacity has seemed excessive, but the growth of steel car construction is such that in the coming year at least the mills will be well employed.

The structural steel trade, which Andrew Carnegie once said was "a business of infinite detail," has been developed in recent years by those already engaged in it, the only important new producers since 1900 being those at Buffalo, Pottsville and South Bethlehem.

In steel bars the new capacity provided since 1900, outside of that at Buffalo, is represented in the continuous mills of large interests long in the business, or, as in the case of the Republic Iron & Steel Company, succeeding to the business of a number of small interests. The competition of small iron rolling mills, whose raw material is scrap, has made steel bars unattractive to steel companies seeking new outlets for their converting and melting capacity. Yet it is evident that the effectiveness of this competition from scrap made bar iron is diminishing. Open hearth furnaces are so largely absorbing the old material supply that bar iron from the busheling furnace is becoming permanently too expensive to compete with steel. Just now a large new supply of open hearth steel is looming up from plants under construction, or to be built in 1910. This will operate to reduce bar iron consumption in two ways: It will mean further competition for the available wrought scrap and thus tend to increase the cost of scrap made bar iron; it will also mean an increased production of open hearth steel bars. It is usually said that certain uses will always demand bar iron, but offsetting this fact is the uncertain quality of the busheling scrap of to-day. It is an abnormal and not a permanent condition that maintains a higher price for busheling furnace bars than for open hearth steel bars, or even the same price.

Threatened competition by the Carnegie Steel Company in the wrought pipe field was the principal cause of the furor over an impending steel war that preceded the formation of the United States Steel Corporation. The extensions in this line have been largely by the leading producer. Two Central Western companies having their own blast furnaces and steel works supply only a portion of the new demand that has grown up since the Steel Corporation was formed, and a third plant, now going up in the Youngstown District, is likely to find employment without strenuous elbowing. The fact that some of the more important extensions of the Steel Corporation have been made by its pipe and tube subsidiary, and that its production in these lines was 65 per cent. greater in 1907 than in 1904 suggests that the field has not been overcrowded.

Sheets and tin plates are products on which competition for the largest producer has been steadily growing. This has come in most cases from companies dependent upon the market for their supplies of steel. With a comparatively small investment such plants find the adjustment of their operations to the varying conditions of trade far less difficult than do larger interests. Thus they have withstood the vicissitudes of recent years, and have become an increasingly important factor. It is significant that recently a greater amount of tin mill erection has been under

way than in several years, and more significant that for the first time since the sheet and tin plate consolidations were formed a large steel company should enter the lists as a competitor for tin plate business.

The wire trade has assumed prominence in recent months because of the large amount of new competition springing up in it. After the acquisition of the Union and Sharon companies by the United States Steel Corporation wire products were for several years the line in which it was most immune from competition. In the past two years the outside production has been growing again, with at the same time increasing activity by the leading producer. Competitive capacity has been strongly developed in the Youngstown and Pittsburgh districts. In the South a company grounded in ore and coal is now being rehabilitated and a new and larger plant is going up. A large Pittsburgh interest is building rod and wire mills, and within two weeks announcement has been made that a western Pennsylvania steel company will add wire products to the lines in which it has long been prominent. It may be that the increasing consumption of wire products in recent years has attracted this new competition, and there was, perhaps, the added incitement of the very large percentage of the wire output furnished by Steel Corporation plants. For some of those now entering upon wire manufacture the selling side of the business will doubtless present one of the largest problems, as the Steel Corporation's selling organization in this trade has been conspicuously strong. One consideration may temper some of the enthusiasm with which this field is apparently being entered. It has to do with the increasing replacement of wood as a material of construction. How far this will affect the demand for wire nails in the next decade is a question of no small interest.

The above general survey of the situation suggests that important possibilities are involved in the new moves now being made in various departments of the finished steel trade. Since regulation of output and agreements on prices are no longer possible, something may be heard again, as was heard not many years ago, of the survival of the fittest.

#### A Fear Dispelled.

The passage of time has definitely disposed of the fears of those who saw an ominous parallel between the years 1895 and 1909. When the revival in business set in last May many immediately recalled the fact that a similar revival had occurred in the spring of 1895, just two years after the panic of 1893. Inasmuch as precisely the same length of time had elapsed since the panic of 1907 apprehension was felt that the revival of 1909 was perhaps due to the same influences which had brought about the revival of 1895 and might have the same ignominious termination. In 1895, as it afterward appeared, the heavy buying movement which set in was forced on the country by the growth of its requirements in iron and steel, and by the compulsory purchases of those consumers who had deferred their entrance into the market as long as possible. In the brief period of business activity the blast furnaces, rolling mills and steel works were driven to their capacity to supply the demand, with a corresponding rise in prices.

The parallel shown by the events of 1909 seemed

sufficiently striking to deserve serious consideration. It was noteworthy that the demand increased about as rapidly in 1909 as it had done in 1895. The same phenomenon was seen of the demand outrunning the supply and of premiums being offered for the prompt shipment of various products. As the fall months wore on indications of weakening were eagerly looked for by those who entertained these apprehensions. They have found, however, that the situation is radically different from that of 1895-6. The country is not now confronted with currency troubles as in the anxious days of fourteen years ago, and our finances are therefore on a very much stronger foundation. It was the apprehension regarding the conflict over the gold standard which brought about the creeping paralysis that ultimately led to the complete prostration of business in 1896. With the passing of 1909, therefore, we will probably have an end of the dismal comparisons drawn with 1895.

One conclusion may, however, be drawn from the experience of 1895 which is well worth bearing in mind. It is that the extraordinary increase in demand which follows a period of business depression is largely due to the covering of long deferred requirements. We passed through this stage in 1909 and cannot expect that the business of 1910 will be greatly stimulated by this special influence. We must now look for current requirements and new enterprises to furnish the demand for iron and steel upon which the trade must depend. It seems reasonable to believe that the feverish buying has passed, and that the year upon which we have entered will see much more steadiness. We have every reason to expect that, owing to the growth of the country and the necessity for expansion of production to meet the increased per capita consumption, we will have activity in the entire trade. It will be very much better for all concerned to have a sufficiently large volume of business to keep our iron and steel establishments well employed, but not to have a continuance of the rush of buyers which was so noticeable in the fall months of last year. With no disturbing influences, whether financial or legislative, we can rather confidently expect this year to show better results than any of its predecessors.

#### Hindrances of the Machine Builder.

In a recent address before the machinery builders of Cincinnati, Charles H. Norton of the Norton Grinding Company, Worcester, Mass., called forceful attention to the difficulties attending the machine tool manufacturer, the inventor and the designer, in bringing their products into successful use in the works of customers. The adage used to be "Buyer, beware!" on the theory that all manufacturers were dishonest in representing their goods. This has changed, for today the machinery builder, in common with many other lines, manufactures on honor, if for no other reason, because it is the only policy that pays. Now a new adage is heard, "Seller, beware!" His troubles with those for whom he has developed his machinery, those who are dependent upon it if they are to achieve and maintain success, seem to increase instead of diminish. According to Mr. Norton—and his views are much the same as those often expressed by other machinery builders—the fault is the combination of the

modern purchasing agent, the shop foreman or workman, upon whose judgment he relies, and the manager who neglects to give the proper attention to such matters. The automatics and semiautomatics, the grinding machines and other tools of a somewhat special nature are notable sufferers.

The builder of a machine which he believes could be used to advantage in some shop may have difficulty in securing the original order, which is quite as it should be, perhaps, for the purchasing agent should look into all such matters carefully and warily, in order that he may establish beyond a doubt that the new machine will effect an economy or an improvement in the product. Once installed, the difficulty arises in securing the correct practice in the machine's operation. An ignorant or prejudiced foreman may make an unfavorable report, and his word is accepted. The builder is notified and sends a demonstrator to look into the complaint. So far the transaction seems a fair one. But when a foreman's opposition develops into persecution, which happens too many times, then the purchasing agent should go beyond him and seek a better guide to his judgment.

The machinery demonstrator is a comparatively recent institution, the personnel of which has improved constantly. The men selected for this purpose are of more than ordinary ability and education. They include scientifically trained engineers, as well as those who have succeeded beyond the ordinary in the shop. They are experts in their respective lines. Their every incentive is to assist the customer; there can be no purpose in deceiving him. The machine is only the initial unit of many which it is hoped will be sold for the shop as a result of the success for which the demonstrator is striving. The one purpose of his professional life is to establish his machine, so that it will do the maximum of work for which it is intended. He has competition, usually, which is another check on his integrity. Yet, in spite of these self evident facts, in some shops the foreman's word, or that of a workman, is accepted as final, and that of the demonstrator is discredited. He is even received with scant courtesy and obstacles are sometimes placed in his way by men who may have a motive for preventing his success. Demonstrators of machinery which is known the world over, built by long established concerns whose names are synonymous with the highest skill of the designer and manufacturer, have scores of incidents to relate to illustrate the truth of the statements, some of them almost unbelievable, so gross are the circumstances.

It is unfortunately true that managers may be seriously handicapped by their purchasing departments, just as they can be assisted in a wide variety of ways, including those forms of co-operation which are appreciated by the sales department. Where the purchasing agent is of the former type, the fault not only rests with him, but also with the managing head, who vests in him too great an authority. Co-operation should extend throughout the executive and manufacturing force in every works. In the case of a complaint regarding a new machine, no foreman's unattested judgment should be taken without investigation. The engineers of the drafting room are available. So are the experts of the builder of the tool. Every facility should be afforded these men in their efforts to bring the machine to a basis of productive efficiency. In this the buyer is, of course, assisting himself. He

wants the machine to do the work as claimed for it by its builder, for if it does it will assist in making money for its owner. If it fails, after a fair test, in which the demonstrator has been given reasonable opportunity, then is the time for a final condemnation. A curious inconsistency exists in the occasional failure of one machinery builder to give a fair trial to the machines of another, usually because the management has relied too much on the statements and advice of those not competent to judge the case. The railroads are frequent offenders. Their shops are full of prejudices against labor saving machinery. The automobile trade is another notorious example.

Mr. Norton suggests that the machine tool builders get together in the matter as a means of self-protection. Some system of co-operation by which a fairer and better condition would be created would result in large saving of expense, for where the work of the demonstrator is made difficult his services count up quickly into money. When it is considered that unnecessary complaint may require four or five visits to the works where a machine has been installed, it is not difficult to see where the profits on the tool have been cut close to the cost mark.

The question is one that should receive the attention of employers of purchasing agents. Many of the latter understand already that the designer and inventor and tool builder are among the best friends of their houses, which depend upon them for the means with which to make money. Other purchasing departments should be compelled to encourage the machinery people in every reasonable way, instead of forcing them to undergo unjust criticism and even humiliation at the hands of humble subordinates in the shop, as well as subjecting them to large and unnecessary expenditures of money. The co-operation should be accomplished between the buyer and seller, instead of by a trade forced by circumstances to protect its interests.

#### Industrial Railroads Unpopular.

The recent "tap line" decision of the Interstate Commerce Commission has an important bearing on the status of all industrial railroads, especially those that are subsidiary to one industry. The commission, after several years of investigation, has condemned the practice on the part of long haul railroads of giving an allowance from a through rate to a tap line lumber road, and the particular ground upon which the commission holds that a tap line is not entitled to a share or allowance of the rate is that such a road is a mere "plant facility" of the lumber industry with which it is identified. It is evident that a railroad built to carry iron ore or raw materials of any kind or to perform switching service for a large industry would fare no better in a test case before the commission than a lumber road of the character under review, and the policy thus outlined by the commission is looked upon as unfortunate.

It is the practice of the railroads, especially in the South, to make blanket tariffs in which the rates from all shipping points in a producing territory are on an equal basis to St. Louis or the Ohio River, whether the lumber originates on the main line of the railroad making the tariff, or on a branch road operated by it or on a tap line. In the great lumber territory of the North-

west and the Southwest, a considerable portion of the mileage of the existing railroad systems was originally built by lumber men. The trunk lines or large systems could not or would not build roads into the territory where lumber men wished to develop mills, and when the necessary roads were built by the lumbermen themselves they were recognized in through tariffs to distant markets the same as though they were branches or spurs of the main line. The tap line was regularly organized as a railroad company under State laws, holding and exercising all the rights of a railroad company, and received an allowance or proportion from the through rate to represent its share of the haul and the cost of performing the service.

The commission now holds that a tap line is not entitled to recognition as a railroad if it is owned by a lumber company or by the same stockholders as the lumber company which furnishes its principal traffic. If the tap line were a branch road of some large system or trunk line the blanket rates on lumber would apply and the expense of operating the line would be covered by the regular tariff rate. Where, however, the tap line has been built by the lumbermen themselves because the railroad bankers who control the business of building railroads would not provide them with facilities to develop the country in which they wish to do business, their road becomes a mere "plant facility." Interpreting this theory broadly it is no longer permissible for lumbermen to engage in the business of building and operating railroads, or if they persist in such enterprises they must do so at their own expense, and not be permitted to enjoy the rights of a railroad built by bankers over the same routes to perform the same service. Since the interstate commerce law was enacted the business of building independent railroads has gradually come to an end, becoming more unprofitable with each accretion to the authority of the commission. Very little new mileage is now constructed except by large systems or subsidiary companies controlled by them; and independent action will undoubtedly cease entirely, now that it is under the ban of the Government.

Industrial carload traffic is the most profitable business handled by railroads, so much so that it might be said that practically all dividends of railroads are paid by carload industries. In the past railroads have never considered as a burden the expense which they incur for switching and other service in connection with large industries, and it has been the universal custom to make a fair allowance from the through rate to any tap line or subsidiary road that would bring in traffic from the forests or mines which lie at a distance from the railroad's own track. It seems that in the future any adjustment of this kind is to be regarded as a concession or rebate to a shipper.

### French Tariff Revision.

Markt & Co., Ltd., Paris, have favored us with the table given below which shows the present French tariff on metal articles most exported from the United States to France, and the new tariff voted by the Chamber of Deputies, which will probably be approved by the French Senate. The first column represents the minimum tariff now paid by products of all European countries except Portugal. The second column

represents the maximum tariff now paid by American products. The third column represents the proposed minimum tariff applicable to European countries. The fourth column represents the proposed maximum tariff applicable to American products.

#### Duties Imposed per 100 Kg.

	Old tariff.— Min- imum. Francs.	Old tariff.— Maxi- mum. Francs.	New tariff.— Min- imum. Francs.	New tariff.— Maxi- mum. Francs.
Machine tools weighing:				
More than 15,000 kg.....	10	15	10	15
5000 to 15,000 kg.....	10	15	12	18
1000 to 5000 kg.....	10	15	16	24
250 to 1000 kg.....	16	20	24	36
250 kg. and under.....	50	70	50	75
Spades, shovels, picks.....	22	27	12	18
Scythes.....	22	27	25	33
Sickle.....	22	27	30	45
Scroll, band and circular saws.....	22	27	35	53
Hand saws.....	22	27	25	38
Files and rasps:				
Length 35 cm. (14 in.) and over.....	22	27	30	45
Length 35 cm. (14 in.) and under.....	22	27	40	60
Vises, stocks, ratchets, bit braces, breast drills, wrenches of all kinds, weighing each, net:				
15 kg. and more.....	22	27	15	25
3 to 15 kg.....	22	27	25	38
3 kg. and under.....	22	27	35	53
Mechanics' tools: Drills, taps, dies, reamers, milling cutters, in one piece, with largest cutting diameter of:				
25 mm. and over.....	22	27	50	75
10 to 25 mm.....	22	27	100	150
10 mm. and under.....	22	27	150	225
Shearing blades, turning, planing, mortising, knurling, reaming and lathe tools, reamers and milling cutters, with blades separable.....	22	27	40	60
Other tools.....	22	27	25	33
Electrotypes.....	..	..	150	200
Ordinary cutlery and tailors' shears.....	20	30	20	30
Pruning shears weighing, each:				
150 g. and over.....	20	30	20	30
150 g. and under.....	20	30	40	60
Kitchen and butcher knives.....	100	125	100	150
Razors, ordinary.....	200	250	200	300
Pocket knives, ordinary scissors, sugar cutters, cutlery, high grade.....	300	375	300	450
Table ivory and pearl handle knives.....	600	800	600	900
Others.....	480	600	480	720
Blades of razors, knives, scissors:				
Rough casting.....	..	..	18	27
Scrapped.....	..	..	100	150
Half finished.....	..	..	300	450
All finished.....	600	800	600	900
Locks and padlocks:				
All iron.....	15	20	15	23
Iron and brass, without tumblers.....	20	25	20	30
Iron and brass, with tumblers.....	20	25	25	38
Brass, with or without tumblers.....	20	25	30	45
Padlocks:				
Iron, not finished.....	15	20	15	23
Iron, with tumblers.....	15	20	20	30
Others, without tumblers.....	20	25	25	38
Others, with tumblers.....	20	25	30	45
Keys, hinges, cupboard turns.....	15	20	15	23
Keys, with brass parts or all brass.....	20	25	20	25
Chains, iron or steel:				
Link, diameter 15 mm. and over. 8	8	12	8	12
Link, diameter 8 to 15 mm. 8	8	12	12	18
Link, diameter 8 mm. and under. 8	8	12	16	24
Rivets, screws:				
25 mm. and over.....	14	20	10	15
18 to 25 mm.....	14	20	12	18
12 to 18 mm.....	14	20	14	21
8 to 12 mm.....	14	20	18	27
3 to 8 mm.....	14	20	24	36
3 mm. and under.....	14	20	28	42
Household and all articles not specified of iron or steel:				
Not polished nor painted.....	14	17	17	26
Painted, polished, galvanized.....	16	21	18	27
Varnished.....	18	24	20	30
Enamelled, tinned.....	25	30	38	42
Coppered and painted, tinned and varnished.....	25	30	30	45
Copper tools, alloy of copper and tin.....	20	35	30	45
Measuring tools: Micrometers, callipers, graduated rules, gauges, &c. ....	..	300	450	

## OBITUARY.

FRANK B. SMITH.

Frank Biddle Smith, president of the Crucible Steel Company of America, died at his home, Sewickley, Pa., December 30, from apoplexy, aged 50 years. He had been in the steel business practically all his adult life. He was born in Allegheny, Pa., and was graduated from the Western University in the class of 1877. Entering the employment of Smith, Sutton & Co., of which firm his father was a member, he became weigh clerk, and worked himself up through various positions until he was familiar with all the branches of the steel business. The firm of Smith, Sutton & Co. became Smith Brothers & Co., and later the La Belle Steel Company. On the organization of the last-named company Mr. Smith was made president.

When the La Belle Steel Company was absorbed by the Crucible Steel Company of America in 1900 Mr. Smith was made the secretary of the new corporation. From this position he was promoted to be assistant to the president and general manager. In May, 1903, he was elected president, occupying that position at the time of his death. He was one of the organizers of the Railway Steel Spring Company, which took over a large number of spring manufacturing establishments throughout the United States. At the time of his death he was a trustee of the Dollar Savings Bank and a director of the Union Savings Bank. He leaves a widow, three sons and one daughter.

JOHN H. LIDGERWOOD, vice-president and treasurer of the Lidgerwood Mfg. Company, 96 Liberty street, New York, with plants in Newark, N. J., and Brooklyn, died January 1 at his home in Morristown, N. J., aged 80 years. In 1858 he became connected with the Speedwell Iron Works, established near Morristown in 1812, which later developed into the Lidgerwood Mfg. Company, now one of the largest manufacturers of cableways and contractors' machinery in the country. Mr. Lidgerwood was a member of the Morristown Club, the New York Yacht Club and the Machinery Club of New York. He leaves a widow and several children.

FRANCIS WOOD, president of the Esterbrook Pen Company, died December 31 at the Waldorf-Astoria Hotel, New York, aged 70 years. He was born in Flushing, Long Island.

HENRY L. SHIPPY, New York, died of cancer January 2, aged 64 years. He had been connected with the John A. Roebling's Sons Company for 35 years, or since he came to New York from Emilie, Bucks County, Pa., where he was born. He leaves a widow and two daughters.

JOSEPH F. MITCHELL, secretary and treasurer of the Penn Bridge Company, Beaver Falls, Pa., died December 21.

**The New Mount Vernon Steel Car Shops.**—The Mount Vernon Car Mfg. Company, Mount Vernon, Ill., has let a contract to the McClintic-Marshall Construction Company, Pittsburgh, for a complete new plant for the manufacture of steel freight cars, the estimated capacity to be 25 cars per day. It is to be completed in five months, and will be operated in connection with the old shops, which now have a capacity of 25 wooden cars per day. The main erecting shop will be 150 x 800 ft.; paint shop, 75 x 450 ft.; store house, 75 x 150 ft.; machine shop, 75 x 175 ft., and pattern shop, 60 x 100 ft. The power house will probably be 100 x 100 ft., equipped with water tube boilers, chain grate stokers, cross compound condensing Corliss engines, operating direct connected generators, and

cross compound Corliss air compressors. Wherever practicable, all machines in the shops will be operated by electric motors, but air and hydraulic machinery will be used where necessary.

## A Labor Movement for Drastic Anti-Immigration Laws.

WASHINGTON, D. C., January 4, 1909.—The prediction made in this correspondence two months ago that early in the present session an effort would be made to repeal Section 40 of the Immigration act of 1907, creating the Division of Information in the Bureau of Immigration "to promote the beneficial distribution of aliens admitted into the United States among the several States and territories desiring immigration," has been verified by the introduction in both Houses of bills placing further restrictions upon immigration and abolishing the Division of Information, which since the date of its organization has been the object of ceaseless attacks on the part of the leaders of organized labor. Not content with wiping out the Division, however, the labor leaders are urging the enactment of new and drastic immigration laws. The movement to obtain this legislation should be followed by all manufacturers and other employers, for the pending bills are curious mixtures of desirable and undesirable provisions, some of the latter being carefully hidden in obscure phraseology.

The text of section 40, under which the Division of Information was established in July, 1907, and which it is now sought to repeal, is as follows:

It shall be the duty of said Division to promote a beneficial distribution of aliens admitted into the United States among the several States and Territories desiring immigration. Correspondence shall be had with the proper officials of the States and Territories and said Division shall gather from all available sources useful information regarding the resources, products and physical characteristics of each State and Territory and shall publish such information in different languages and distribute the publications among all admitted aliens who may ask for such information at the immigrant stations of the United States and to such other persons as may desire the same.

Although it was the intention of Congress that the division should include the collection and distribution of information designed to enable unemployed workmen of all classes, whether arriving immigrants or citizens of the United States, to find employment, and notwithstanding the excellent beginning which the Division made on a broad and comprehensive basis, its work within the past few months has been restricted to a very narrow scope and to-day is limited to finding employment for farm laborers and domestics. No reasonable argument, based upon work which the Division has done or attempted to do in the past, has been put forward in support of the demand for its abolition. Charges have been made, however, that the Division has sought to assist manufacturers with strikes on their hands, but the official records showing the work of the Division day by day since its organization effectually disprove these allegations.

Much work done by the Division absolutely goes to waste, for its daily mail is filled with applications from manufacturers and others desiring workmen and with urgent requests of skilled mechanics to be directed to places of employment, which cannot be acted upon because of the restrictions imposed by the standing regulations. It often happens that on the same day applications will be received from employers and from would-be employees in the same industry, but which the Division must ignore because the labor leaders have induced the Department officials to limit the activity of the Division of Information until it is little

more than an intelligence office for house and farm servants.

In no previous Congress have so many radical anti-immigration bills been introduced, nor have the propositions embodied therein been so ingeniously calculated to reduce immigration to a minimum. Should certain provisions be enacted, an alien workman would be obliged to pay a head tax of \$10 upon his arrival and take out annually thereafter a license at an additional tax of \$10 per year until he should become naturalized.

Some of the measures provide educational qualifications which are not now required, and it is an interesting fact that the most drastic of the provisions of these measures are ingeniously coupled with restrictions based on moral grounds, and having for their object the reform of abuses to which much attention has lately been drawn. The promoters of this legislation doubtless count upon the public sentiment that recently has been aroused against immoral practices to aid them in forcing through laws which would shut out honest, able-bodied workmen along with the padrones, the procurers and their victims.

W. L. C.

## PERSONAL.

John R. Back, for many years superintendent of the shops of the F. E. Reed Company, Worcester, Mass., has been elected superintendent of the new Worcester Trade School.

Seneca G. Lewis has resigned the office of sales manager of the Winchester Repeating Arms Company, New Haven, Conn., to become general manager of the Pennsylvania Rubber Company, Jeannette, Pa. He will make his residence in Greensburg, six miles from Jeannette. He will assume his new duties February 1.

George Walworth Hayden has been made general plant manager and superintendent of the Pratt & Cady Company, Hartford, Conn. Mr. Hayden was for 19 years with the Crane Company, Chicago, working through the departments to the position of general manager, after having been chief draftsman, foreman, superintendent and manager of all the brass, malleable and cast iron departments. He has also been with the United States Steel Corporation, and last year was works manager of the McNab & Harlin Company, Newark, N. J.

Alfred Lorenz, formerly superintendent of the Keystone Foundry Company's plant at Avonmore, Pa., has been appointed general manager of the Deemer Steel Casting Company, New Castle, Del.

Chas. J. Caley, formerly general manager of the Russell & Erwin Mfg. Company, New Britain, Conn., is works manager of the Peterboro Lock Company, Peterboro, Canada. Mr. Caley was president of the American Brass Founders' Association in 1907-8.

David Coulter has resigned as secretary and treasurer of the Keystone Steel Casting Company, Chester, Pa.

J. N. Cross, for many years connected with the Bay View, Wis., works of the Illinois Steel Company, has resigned, having accepted the position of superintendent of the punch and press department of the A. O. Smith Company, Milwaukee, manufacturer of pressed steel automobile frames.

George M. Brill and Horace C. Gardner have entered into partnership under the name of Brill & Gardner, to continue the engineering and architectural practice formerly conducted by Mr. Brill, who has been engaged for many years in constructive engineering work and for 12 years has specialized in the design of complete manufacturing and power plants. For over 20 years Mr. Gardner has been manager of the construction and mechanical departments of Swift &

Co., with active charge of a wide range of construction and engineering matters pertaining to packing houses, industrial plants, cold storage, ice making and refrigerating, and the building and maintenance of railroad equipment.

C. H. Brushaber announces that he is the sales agent for the Osterberg Tinplate Company and the McKeesport Tinplate Company, manufacturers of high grade black plate and tin plate, with office in the Hudson Terminal Building, New York.

W. J. Best, for the past three years Chicago sales manager and engineer for the Buckeye Engine Company, has become treasurer of the Wheeler Condenser & Engineering Company, Carteret, N. J. Before his connection with the Buckeye Engine Company, Mr. Best was for five years sales engineer in the Chicago office of the Green Fuel Economizer Company and prior to that was erecting engineer for E. F. Williams. Besides acting as treasurer of the Wheeler Condenser & Engineering Company, Mr. Best will also have charge of part of the sales and engineering work.

Walter Laidlaw, vice-president and general manager of the Snow Steam Pump Works, Buffalo, N. Y., a subsidiary corporation of the International Steam Pump Company, has been promoted to a position of enlarged responsibility with the parent company in New York City. He will be succeeded by A. Neidermeyer, manager of the Power & Mining Machinery Company, Milwaukee, Wis.

Michael J. Drummond, of M. J. Drummond & Co., New York, has been appointed Commissioner of Charities by Mayor Gaynor of New York City. The department over which Mr. Drummond will preside is one of the most important in the administration of the city's affairs. It has charge not only of almshouses, but also of the city hospitals and numerous other institutions in which the poor of the city are cared for.

E. L. Billingslea, one of the Chicago partners of Rogers, Brown & Co., sailed from New York, January 5 for a trip to Egypt. Having been much depressed by the recent death of his wife, he hopes to recover his health by an extended vacation, returning in April. He is accompanied by Joseph J. Olsen of the Chicago office of Rogers, Brown & Co.

A. C. Dinkey, president of the Carnegie Steel Company, Pittsburgh, has been elected a member of the Board of Directors of the Carnegie Institute, at Pittsburgh, to succeed Robert Pitcairn, deceased.

At a meeting of the directors of the Crucible Steel Company of America, held last week in the Frick Building, Pittsburgh, Herbert Du Puy was elected president to succeed Frank B. Smith, deceased.

Bertram D. Robinson, heretofore a salesman for the pig iron firm of Nash, Isham & Co., New York, has taken a similar position with B. Nicoll & Co., New York.

**Baldwin Locomotives Built in 1909.**—The Baldwin Locomotive Works, Philadelphia, Pa., built 1023 locomotives in 1909. While this number is gratifying, compared with the number built in 1908, which was only 617, it does not represent the maximum capacity of the works, which is about 2700. The nearest approach to the maximum number was reached in 1907, when 2663 were completed. The output of 1909 is still more gratifying, as compared with 1908, from the fact that it comprised a number of Mallet locomotives of special design and unusually large size for the Atchison, Harriman, Great Northern and other lines. Of the 1023 engines, 138 were for export to Brazil, Porto Rico, Cuba, China, Chile, Antioquia, Hawaii, British Columbia, Argentina, Mexico, Santo Domingo, Nicaragua, Canada. There were 826 steam engines and 197 electric.

## Pig Iron Production.

### Little Change in the Daily Rate Last Month.

#### Capacity Active January 1 Slightly Less Than on December 1.

The pig iron statistics of January 1, compiled from reports from the blast furnaces, show that production is about stationary. The output in December, a 31-day month, was 2,635,680 gross tons of coke and anthracite iron, against 2,547,508 tons in November—a daily rate of 85,022 tons last month, or 105 tons more than the daily average for November. The number of furnaces blown in last month was one less than of those blown out, so that 313 were in blast at the opening of the year. December was the first month since April in which a gain in the number of active furnaces was not shown. The capacity active January 1 was 595,216 tons a week, against 598,216 tons December 1, a falling off of 3000 tons a week. This was caused in part by insufficient coke supply in some districts, due to the heavy snowfall, and in part by the flooding of an iron mine in the Birmingham District, which cut down the ore supply.

#### Pig Iron Production in 1909.

The pig iron production in the second half of 1909 (charcoal iron estimated) was about 14,750,000 tons, or 3,725,000 tons more than in the first half. The total production for the year was close to the high record of 25,781,361 tons made in 1907. The official figures for the charcoal pig iron output will be required to determine whether the production in 1907 was actually exceeded.

#### Daily Rate of Production.

The daily rate of production of coke and anthracite pig iron by months, beginning with December, 1908, is as follows:

#### Daily Rate of Pig Iron Production by Months.—Gross Tons.

	Steel works.	Merchant.	Total.
December, 1908.....	35,172	20,986	56,158
January, 1909.....	35,983	21,992	57,975
February.....	38,367	22,609	60,976
March.....	36,811	22,421	59,232
April.....	36,436	21,526	57,962
May.....	40,531	20,222	60,753
June.....	45,507	19,149	64,656
July.....	48,670	19,123	67,793
August.....	51,354	21,192	72,546
September.....	55,361	24,146	79,507
October.....	57,067	26,789	83,856
November.....	56,333	28,584	84,917
December.....	57,058	27,964	85,022

#### Production of Steel Companies.

Returns from all plants of the United States Steel Corporation and the various independent steel companies show the following totals of product month by month. Only steel making iron is included in these figures, together with ferromanganese, spiegeleisen and ferrosilicon. These last are stated separately but are indicated in the first three columns of "total production."

#### Production of Steel Companies.—Gross Tons.

	Pig.—Total production.—		Spiegeleisen and ferromanganese.		
	1907.	1908.	1909.	1908.	1909.
January.....	1,406,397	664,415	1,117,823	20,254	12,325
February.....	1,317,923	745,802	1,073,363	9,402	10,046
March.....	1,424,827	841,502	1,140,553	13,750	23,743
April.....	1,446,788	725,548	1,093,092	12,363	22,478
May.....	1,470,080	759,674	1,256,448	17,823	20,834
June.....	1,457,230	717,689	1,365,527	15,958	16,516
July.....	1,452,557	798,639	1,508,762	10,250	17,613
August.....	1,445,685	897,052	1,591,991	14,932	22,313
September.....	1,417,153	933,514	1,660,839	8,938	28,148
October.....	1,514,521	996,481	1,769,094	12,174	25,384
November.....	1,084,114	981,167	1,689,994	15,882	23,376
December.....	659,459	1,090,339	1,768,799	6,510	20,791

#### December Output by Districts.

The table below gives the production of all coke and anthracite furnaces in December and the four months preceding:

	August. (31 days)	Sept. (30 days)	Oct. (31 days)	Nov. (30 days)	Dec. (31 days)
New York....	173,317	176,777	184,075	178,783	166,725
New Jersey....	22,765	29,703	32,778	36,444	35,711
Lehigh Valley.	58,607	62,332	68,339	66,703	65,951
Schuylkill Val.	48,105	52,234	56,251	56,463	57,585
Lower Susquehanna and Lebanon Val.	54,713	69,252	75,542	71,463	75,737
Pittsburgh Dis.	538,294	548,968	594,052	573,439	617,952
Shenango Val.	143,722	154,614	164,564	157,984	157,901
West. Penn. ....	118,174	125,712	140,338	139,168	146,732
Md., Va. and Kentucky....	67,752	64,652	74,327	75,661	75,450
Wheeling Dis.	125,281	126,077	139,832	135,274	139,496
Mahoning Val.	207,887	211,979	220,093	232,230	233,147
Central and North. Ohio....	153,797	187,366	213,585	208,559	217,217
Hocking Valley.					
Hanging Rock and S.W. Ohio.	26,804	30,628	39,921	42,735	48,163
Mich., Minn., Mo., Wis., Colo. ....	61,980	62,601	68,709	62,088	67,626
Chicago Dis.	282,668	300,261	316,673	284,725	314,634
Alabama....	139,131	154,353	175,892	184,291	177,568
Tennessee, Georgia and Texas....	23,483	27,697	33,970	41,498	38,085
Totals....	2,248,930	2,385,206	2,599,541	2,547,508	2,635,680

#### Capacity in Blast January 1 and December 1.

The following table shows the weekly capacity of furnaces in blast January 1 and December 1, the furnaces blown in in December being rated on the records of previous performance:

#### Coke and Anthracite Furnaces in Blast.

Location of furnaces.	Total number of stacks.	January 1.		December 1.	
		Number in blast.	Capacity per week.	Number in blast.	Capacity per week.
New York:					
Buffalo.....	16	15	34,968	15	35,294
Other New York....	7	2	2,884	2	2,828
New Jersey.....	8	5	6,440	6	8,504
Spiegel.....	2	0	0	0	0
Pennsylvania:					
Lehigh Valley....	23	16	15,185	16	15,078
Spiegel.....	3	2	742	2	826
Schuylkill Valley....	15	9	12,153	10	13,932
Low. Susquehanna....	7	6	8,905	6	8,678
Spiegel.....	1	1	635	1	658
Lebanon Valley....	10	9	7,910	8	7,338
Pittsburgh Dis.	48	47	136,948	47	133,644
Spiegel.....	3	3	2,525	3	2,959
Shenango Valley....	20	18	35,452	18	36,862
Western Penn. ....	27	20	33,585	19	31,015
Maryland.....	4	3	6,115	3	6,962
Wheeling Dis. ....	14	12	30,842	13	31,563
Ohio:					
Mahoning Valley....	22	20	52,647	21	55,237
Cent. and Northern. ....	21	20	49,049	20	49,130
Hocking Val., Hanging Rock and S. W. Ohio. ....	15	12	10,878	12	10,671
Illinois and Indiana....	31	29	73,105	23	66,365
Spiegel.....	2	1	750	1	845
Mich., Wis. and Minn. ....	9	8	8,604	8	8,910
Colorado and Missouri. ....	7	4	6,925	4	7,496
The South:					
Virginia.....	23	11	8,666	12	10,206
Kentucky.....	5	1	1,463	2	2,058
Alabama.....	46	26	39,530	29	42,425
Tennessee.....	18	12	8,015	12	8,382
Georgia and Texas. ....	4	1	295	1	350
Totals.....	411	313	595,216	314	598,216

Among furnaces blown in in December were one Bird Coleman in the Lebanon Valley, Stewart in the Shenango Valley, one Cambria in western Pennsylvania, one Calumet, one Federal, one Joliet, one South Chicago, one Union and one Gary in the Chicago District, and Zug Island at Detroit.

The list of furnaces blown out in December includes one Wharton in New Jersey, Keystone in the Schuylkill Valley, Fannie in the Shenango Valley, Victoria in Virginia (banked), Ashland in Kentucky, Benwood in the Wheeling District, one Haselton in the Mahoning Valley, two Sloss and one Bessemer in the Birmingham District and Rome in Georgia.

#### A Record of Active Capacity.

The active weekly capacity in coke and anthracite iron has shown the following fluctuations since January 1, 1907, the figures representing gross tons:

	Capacity per week.	Capacity per week.	
January 1, 1910....	595,216	January 1, 1909....	401,994
December 1, 1909....	598,216	December 1, 1908....	381,102
November 1.....	593,608	November 1.....	362,685
October 1.....	565,608	October 1.....	337,925
September 1.....	525,037	September 1.....	313,112
August 1.....	488,742	August 1.....	284,590
July 1.....	463,029	July 1.....	264,452
June 1.....	446,096	June 1.....	259,284
May 1.....	412,010	May 1.....	268,674
April 1.....	409,217	April 1.....	264,890
March 1.....	420,807	March 1.....	267,437
February 1.....	414,497	February 1.....	241,925

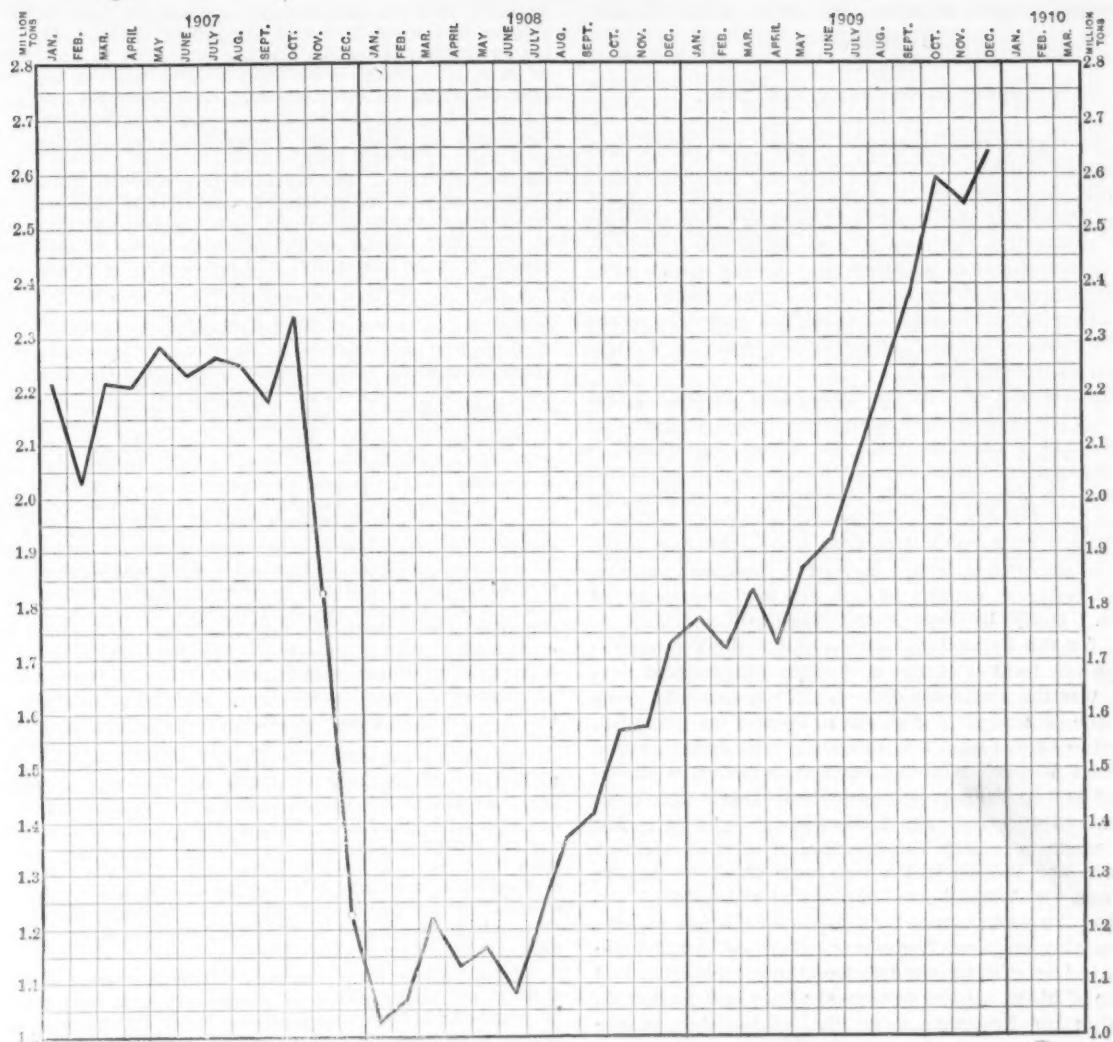


Diagram of Coke and Anthracite Pig Iron Production in the United States in 1907, 1908 and 1909. The dip in the curve in November, 1909, is due to its being a 30-day month, the rate of production being slightly greater than in October.

	Capacity per week.		Capacity per week.
January 1, 1908	235,152	June 1	523,220
December 1, 1907	347,372	May 1	524,538
November 1	491,436	April 1	496,456
October 1	511,397	March 1	511,035
September 1	507,768	February 1	492,359
August 1	513,471	January 1, 1907	507,397
July 1	528,170		

#### The Curve of Pig Iron Production.

The curve of pig iron production for the past three years is shown in the accompanying chart. The figures plotted in the chart, giving production of coke and anthracite pig iron by months, are as follows:

*Production of Coal and Anthracite Pig Iron in the United States by Months in 1907, 1908 and 1909.—Gross Tons.*

	1907.	1908.	1909.
January	2,205,607	1,045,250	1,797,560
February	2,045,068	1,077,740	1,707,340
March	2,226,457	1,228,204	1,832,194
April	2,216,558	1,149,602	1,738,877
May	2,295,505	1,165,688	1,883,330
June	2,234,575	1,092,131	1,930,866
July	2,255,660	1,218,129	2,103,431
August	2,250,410	1,359,831	2,248,930
September	2,183,487	1,418,998	2,385,206
October	2,336,972	1,567,198	2,599,541
November	1,828,125	1,577,854	2,547,508
December	1,234,279	1,740,912	2,635,680

The Marseilles Mfg. Company, Marseilles, Ill., which has been negotiating with Rock Island and East Moline for the removal of its factory to either place, has not come to a decision as yet, but expects the matter to be settled soon, as it is the intention of the company to commence the erection of buildings at one place or the other at any early date. The new plant will be about three and a half times as large as the one now occupied by the company at Marseilles.

The Portland Foundry & Machine Company, Portland, Ind., has completed moving into a new plant at

that place. The plant comprises a drop forge shop, 42 x 100 ft.; machine shop and dieroom, 42 x 80 ft., and a gray iron foundry, 80 x 85 ft. The company contemplates establishing a power plant in the spring, either steam or gas producer and gas engine.

#### The Largest Marine Castings.

According to the *Engineer*, London, some of the steel castings which will be used in the construction of the two mammoth steamships Olympic and Titanic, which are being built by Harland & Wolff, Ltd., Belfast, for the White Star Line, are by far the largest and heaviest marine castings ever produced. The total weight of the stern frame, rudder and brackets in each of these steamships will be approximately 289 tons, made up as follows: Stern frame, 70 tons; after boss arms, 74 tons; forward boss arms, 45 tons, and rudder 100 tons. The stern frame is of special quality mild steel and is of hollow or dished section, constructed in two pieces, 63 ft. and 37 ft. 4 in. in length, respectively. In casting the main piece of the stern frame about 95 tons of molten metal were required.

The making of the mold in which the stern frame was cast represented two months' work and the completion of the finished castings five months more, making seven months in all. It was only possible to transport these enormous castings during the lull of railroad traffic on Sunday and then only by a temporary re-arrangement of the freight train services on the road between Darlington and West Hartlepool, and by observing a speed not exceeding 5 miles per hour. The castings were made by the Darlington Forge Company.

## Chemical Laboratories in Iron and Steel Works.\*

BY GEORGE W. MAYNARD, NEW YORK.

In the biographical notice of Thomas F. Witherbee, published in *Bulletin No. 32*, August, 1909 (p. xxv), it is said that "he is believed to have been the first manager in America to use the chemical laboratory for the purpose of controlling the regular running of the blast furnace." Since the year is not given, I cannot decide as to Mr. Witherbee's priority; but the statement leads me to contribute a bit of history, showing an early departure from the "rule-of-thumb" blast furnace work to the employment of a chemist.

In the autumn of 1868 the department of mining and metallurgy was established at the Rensselaer Polytechnic Institute. In connection with the assay department a laboratory was equipped for making general commercial analyses. In January, 1869, Alexander L. Holley, the manager and builder of the Bessemer plant at the Rensselaer Works of John A. Griswold & Co., the first plant erected in the United States under the Bessemer patents, began to send me samples of ore, pig iron and steel for analysis. Early in 1869 I was regularly retained as chemist for the Rensselaer Works, and while the laboratory was not located at the works, for all practical purposes it was the works laboratory. The increase in work soon made it necessary for me to secure an assistant. I applied to Prof. Charles F. Chandler, who recommended Dr. August Wendel, who had been an assistant of Rammelsberg and had lately landed in New York. Dr. Wendel remained with me until 1873, when I left Troy. My leaving made necessary the erection of a laboratory at the Rensselaer Works, which was done under my supervision, and Dr. Wendel was employed as chemist.

During the period from 1868 to 1873 my work as consulting mining engineer frequently called me to the Lake Champlain iron district and involved the examination and sampling of about all the developed mines and prospects, in hunting for Bessemer ores; for, astonishing as the statement may seem, in the early history of the Bessemer process in the United States pig iron was imported from the West Cumberland District in England. From 1868 to 1872 I frequently visited Mr. Witherbee at Fletcherville and was always greatly impressed by his energy, originality and knowledge of the best European practice. My last meeting with him, at Durango, in Mexico, was a pathetic one, for he was then almost totally blind.

On referring to my record of many hundred analyses during those years, I find that samples of ore, pig iron, which would indicate that chemical laboratories were slag and steel came from many widely scattered works, exceptional in connection with iron and steel works.

## Legal Decisions of Interest to Manufacturers.

ABSTRACTED BY A. L. H. STREET.

**Trademarks—Priority of Use, Assignability and Abandonment.**—Neither complainant nor defendant held entitled to the exclusive use of the word "Globe" as a trademark for washing machines; it appearing that it had been in use by another manufacturer and his successors in business, whose machines were sold throughout the country for some years before its adoption by either, and that such use continued for some years afterward. The right to a trademark cannot be assigned, except as an incident to the sale of the business and good will in connection with which it has been used, or as an incident to the sale of the premises where the article has been made and has acquired a special reputation in connection with such place. Where the owner of a trademark has permitted other manufacturers to use it for a number of years without objection, it becomes so far common property that the only restriction which can be imposed on its use is that each user shall so identify his goods as to indicate their origin, and prevent confusion and deception and unfair competition. (United States Circuit Court of Appeals, Sixth Circuit, Dietz *vs.* Horton Mfg. Company, 170 Federal Reporter 865.)

**Freight—Contracts for Transportation.**—A receipt by an initial carrier of freight recited that the goods were received in good order for consignee, subject to the bill of lading, and

provided that the property received on the dray ticket was subject to the conditions of the bill of lading. The bill of lading contracted for the carriage of freight to the consignee or to a connecting carrier, and limited liability for loss to that occurring on its own line. Held, that the receipt and bill of lading did not establish a contract for through carriage and the initial carrier was liable only for loss on its own line. The rule that, where a carrier receives property for transportation over its own line and the lines of connecting carriers for a lump freight charge, the connecting carriers are, in the absence of proof to the contrary, agents of the initial carrier applies where a traffic arrangement is proved between the initial and connecting carriers, but the rule does not apply where the initial carrier had no interest in, nor connection with, the connecting carrier, except to collect and to pay over to it the freight charge from the end of the initial carrier's line to the point of destination. (St. Louis, Missouri Court of Appeals, Simmons Hardware Company *vs.* St. Louis, Iron Mountain & Southern Railway Company, 120 Southwestern Reporter, 663.)

**Chattel Mortgages—Right to Possession of Property.**—A second chattel mortgagee, who through agents participated in the sale under the first mortgage, at which sale the holder of the first mortgage became the purchaser, was estopped to dispute the title acquired at the sale. The fact that the assignee of a chattel mortgage was a party to notes secured by a second mortgage in favor of a third person, and was indebted thereon, could not be considered in determining the right of the assignee to the possession of the chattels purchased at a sale under the first mortgage. (St. Louis Court of Appeals, Weber Implement Company *vs.* Dunard, 120 Southwestern Reporter 608.)

**Chattel Mortgages—Power of Mortgagee to Sell.**—Sale under a power in a mortgage may be restrained or set aside, where the power is exercised or attempted to be exercised to oppress the mortgagor, or before sale is authorized by the mortgage. A mortgage providing for foreclosure after default, or before default, in case the mortgagor disposes of or parts with possession of the property, and also empowering the mortgagee to take possession of the property at any time before or after default, and sell it, authorizes seizure and sale before default only in case of disposal or attempted disposal of the property. (Alabama Supreme Court, Henderson-Law Company *vs.* Wilson, 49 Southern Reporter 845.)

**Sales—When Title Passes.**—Where the terms of a contract of sale and purchase of goods have been agreed on and the goods have been specifically ascertained, and nothing remains to be done by the seller except to deliver, title immediately vests in the buyer, unless a contrary intention appears though the goods have not been delivered or paid for. Where, though specific goods are in a deliverable condition, there remains some act like measuring, weighing or testing to determine the price which depends on the quantity or quality, the title will not as a general rule pass, in the absence of evidence of an intention to the contrary, until such act is done. (Washington Supreme Court, Lauber *vs.* Johnston, 102 Pacific Reporter 873.)

**Patents—Change in Movability of Parts.**—Making one or two coacting parts stationary and the other movable, where before the first had been movable and the second stationary, does not amount to invention. (United States Circuit Court of Appeals, Sixth Circuit, Duner Company *vs.* Grand Rapids R. R. Company, 171 Federal Reporter 863.)

**Lost Freight—Notice of Loss—Waiver.**—A provision in a bill of lading that, in case the goods shipped are lost, a claim for the "loss or damage must be made in writing to the agent at the point of delivery promptly after the arrival of the property, and if delayed more than 30 days after \* \* \* due time for delivery thereof," the railroad company shall not be liable in any event, is reasonable. The mere inquiry by the consignee requesting the property shipped to be traced, and stating what he supposed the value of the property to be, is not a compliance with the provision. The act of a railroad company in sending a tracer for a lost shipment, after its exemption from liability had attached under a provision of the bill of lading, was not a waiver of its right to claim such exemption if the goods are not located. On receiving notice of a claim for lost goods after the time limited by the bill of lading for making such claim, the carrier's agent asked for certain information, and stated that "promptly on receipt of these documents the matter will receive attention." Held, not a waiver of the delay in making the claim. (Virginia Supreme Court of Appeals, Atlantic Coast Line Railroad Company *vs.* Bryan, 65 Southeastern Reporter 30.)

**Railroad Companies—Discrimination.**—A shipper may maintain an action at law under the interstate commerce act of February 4, 1887, to recover damages from an interstate railroad company because of the giving of a preference or advantage to another shipper by permitting him to keep cars on its terminal tracks without payment of the charges fixed by its schedules while denying the same right to plaintiff. (United States Circuit Court, District of New Jersey, Lyne *vs.* D. L. & W. Railroad Company, 170 Federal Reporter 847.)

\* From the November, 1909, *Bulletin of the American Institute of Mining Engineers.*

### Customs Decisions.

#### Vacuum Cleaning Machines.

Vacuum cleaning machines are held by the Board of United States General Appraisers to be dutiable properly as "manufactures of metal," at 45 per cent. on their value. The case, which is the first one to arise under the tariff since these articles have been on the market, stands in the name of Wilfred Schade & Co. It was the contention of the importers that the machines should be granted entry at 35 per cent. as "manufactures of wood," but this claim General Appraiser Fischer, in his decision for the board, disallows. The decision says that the firm has been dealing in these machines less than a year and that the witnesses before the board appeared to have no knowledge of the relative values of the component materials entering into the manufacture of the machines. The imposition of the metal rate is therefore affirmed by the board.

#### Miniature Wall Clocks and Sewing Machine.

A controversy between the Government and Alfred H. Post & Co. regarding the classification of miniature wall clocks and sewing machines has been decided by the Board in favor of the former. The collector assessed duty on the wall clocks at 40 per cent., and on the sewing machines at 45 per cent., under the provision for manufactures of metal. General Appraiser Fischer, in his decision written for the Board, says that the importers failed to submit any evidence in support of their contention. In view of these circumstances, the Board decides that the various rates of duty levied on the merchandise be taken upon their merits. The importers claimed that both the sewing machines and the wall clocks are to be regarded as "toys" in levying duty. It appears that no testimony was laid before the Board at the time of the hearing and on this account the Board is constrained to deny a lower free entry. The rates exacted by the collector will stand.

#### Steel Stampings.

The Board has taken favorable action on protests filed by A. & H. Veith in the matter of the classification of steel stampings. It is held that the collector erred in returning the merchandise for duty at 45 per cent. as "manufactures of metal." The correct return, as claimed by the importers, and upheld by the Board, is for specific rates under paragraph 135 as "pressed, sheared or stamped shapes" of steel.

#### Bicycles Not Household Effects.

According to a decision handed down by the Board of General Appraisers, a bicycle is not to be regarded for the purposes of assessing duty as a "household effect." The case before the Board stood in the name of Dorsey Brown. He objected to the action of Collector Loeb in assessing the machine at 45 per cent., as a manufacture of metal. His claim was that, as the machine was purchased in America and had been taken abroad and returned, it should be allowed to enter free of duty. General Appraiser Hay, who writes the decision for the Board, is unable to agree with the contention raised by the importer, and therefore affirms the claim of the Government.

The Board has taken similar action involving the classification of an automobile owned by B. Zalduondo, San Juan, Porto Rico. The auto is held not to be a personal effect, and hence the 45 per cent. duty stands.

#### Fish Hooks.

In sustaining the contention of Abbey & Imrie and others, the Board of United States General Appraisers finds that the fishhooks made from round iron or steel wire imported by the former are not valued at more than 4 cents per pound and that the fishhooks in question are therefore dutiable only at the specific rates named in the first part of the paragraph, plus 1 1/4 cents per pound prescribed in the second proviso of the same paragraph. The Government authorities took the position that the wire in the controversy was valued at a

higher rate than that claimed by the importers, and the duty was therefore assessed at the rate of 40 per cent. as well as the 1 1/4 cents per pound additional. General Appraiser Fischer, in his decision, finding in favor of the contention of the importers, takes due notice of the fact that in levying duties it is necessary to take into account rises in value of the material entering into the construction of the fishhooks. As is well known, the assessment of duty on fishhooks has, for years, proved a most difficult proposition.

#### Zinc Sheets.

A protest filed by the Stengel Brothers Company, Pittsburgh, has been decided by the board in favor of the importer. The merchandise consists of zinc sheets in the form of metal tiles measuring 16 1/2 x 22 in. The metal sheets are coated with a white enamel paint. Duty was assessed on the articles at 45 per cent. under the tariff of 1909 as articles not specially provided for, composed wholly or partly of zinc, whether partly or wholly manufactured. The importers' contention was that the merchandise is provided for under paragraph 194 as zinc sheets, coated, and is therefore dutiable at 1 1/4 cents a pound.

#### Razor Blades in the Rough.

Razor blades in the rough are held by the board to be dutiable at the rate of 50 cents per dozen and 15 per cent. ad valorem under the provision for "unfinished razor blades." It was claimed in this case by Pomper & Fulton, the importers, that the blades are dutiable at 35 per cent. as steel forgings, or at the appropriate rates as forms of steel not specially provided for, or at 10 or 20 per cent. as unenumerated unmanufactured, or manufactured articles under section 6 of the tariff. General Appraiser Fischer says, in his decision for the board, that the articles are perfectly formed, seeming to require nothing but smoothing and grinding to make them complete blades.

#### Cork Machines.

Protests filed by H. K. Bentley against the return made by the customs officials on so-called cork machines have been sustained by the board. The Treasury officials took the position that the machines fell within the general provision in the tariff for manufactures of metal not specially provided for. Duty was therefore levied at 45 per cent. It appears, however, that the machines were of American manufacture; that they were exported and then returned to this country without having been improved in value or condition. Judge Somerville, in his decision for the board, sustaining the contention of Mr. Bentley, says that the importer has complied with the regulations of the Secretary of the Treasury establishing the identity of the goods, including both the affidavit of the importer and the export certificate.

#### Scrap Imported by Carnegie Steel Company.

Failure on the part of the Carnegie Steel Company to properly identify scrap steel said to be of American origin, exported, presumably to Canada and then returned, has resulted in the board affirming the action of the customs officials at Cleveland in assessing the merchandise at the rate of \$4 per ton. The law provides that American goods exported and later returned without having been advanced in value or condition shall be accorded free entry. In overruling the claim for free entry, General Appraiser Fischer points out that "the record in the case does not show to our satisfaction that the general Treasury regulations as to proof of identity have been substantially complied with."



The General Fireproofing Company, Youngstown, Ohio, has opened an export office in New York City at 396-398 Broadway, to be in charge of A. D. Level, who has been for a number of years in the office of United States Steel Products Export Company, and in the future all its foreign business will be handled through that office. This change has been made necessary by the large increase in the company's foreign trade.

## NEWS OF THE WORKS.

## Iron and Steel.

The Silver Creek Furnace Company, Rome, Ga., blew out its furnace December 18 for relining. It is expected that the furnace will start again about January 15 on charcoal iron. Heretofore it has made coke iron.

The six furnaces of the Lake Superior Iron & Chemical Company, Detroit, Mich., have been put in good condition in the past year and all are now in blast with the exception of the one at Chocolay, Mich., which will probably be blown in within 30 days. The company has under consideration the building of a wood alcohol plant in connection with the Chocolay furnace.

Equipment is arriving at Gas City, Ind., for the reopening of the plant of the American Sheet & Tin Plate Company, idle for the last three years. One dynamo was sent from Pittsburgh by express, making the largest express package ever received in that city. A. J. Barrett, manager of the mill, is in charge of the work.

No. 4 furnace of the Tennessee Coal, Iron & Railroad Company's Bessemer plant has been blown out for relining. It is expected to have it ready for operation within 60 days.

The furnace of the Southern Iron & Steel Company at Alabama City, Ala., is being dried out and will be blown in within the next week or 10 days on basic iron.

The furnace of the Eagle Iron Company at Attala, Ala., has been relined and put in shape to run on charcoal iron. It will be blown in about March 1.

The Alabama Consolidated Coal & Iron Company is preparing to blow in its idle furnace at Gadsden, Ala. It will produce foundry iron.

The Sloss-Sheffield Steel & Iron Company, Birmingham, Ala., will install a large stone breaker for crushing flux.

The Columbia Steel Company, Portland, Ore., will build an open hearth steel plant on a site of 20 acres or more recently acquired at Black Diamond, Cal. This is to be operated in addition to the company's Bessemer plant, from which its product is now being drawn. There is some talk of getting coal from Alaska.

## General Machinery.

The Thomas Carlin's Sons Company, Pittsburgh, has just shipped to the Indiana Steel Company, Gary, Ind., a 9-ft. dry pan and an 8-ft. automatic wet pan, both belted. It also has received a contract from the Follansbee Brothers Company, Pittsburgh, for a 40-in. electric operated single drum, double geared hoist and a 10-ton tripod skull breaker for use in its steel works at Follansbee, W. Va. The Carlin Company has also an order for a No. 38 shear for Eastern shipment, to be used in cutting scrap.

The General Drop Forge Company, Buffalo, will build and equip a one-story fan house at its plant at Elmwood avenue and the New York Central Railroad Belt Line.

## Bridges.

The Attica Bridge Company, Attica, Ind., has secured the contract for the steel work in the addition to the National Car Coupler Company's plant. The building will be 157 x 160 ft.

## Foundries.

An addition will probably be built this spring to the Atwood Brass Works, Grand Rapids, Mich.

The American Motor Castings Company, Detroit, Mich., will add to the electrical equipment of its plant.

An addition to its fabricating facilities, including installation of new machinery a little later on, is reported to be contemplated by the Chickasaw Iron Works, Memphis, Tenn.

## Power Plant Equipment.

Some new equipment will be required in the spring by F. E. Myers & Bro., pump manufacturers, Ashland, Ohio.

Additional facilities for the manufacture of hydraulic rams will be provided this year in the works of the Deming Company, Salem, Ohio, which has built up a large business in this specialty, formerly only a side line.

The Woodward Governor Company, which is completing a new plant at Rockford, Ill., has provided for the principal equipment, but some additional tools, motors, &c., will be required later on.

For the new substation mentioned in this paper a fortnight ago the Cambria Steel Company has just purchased a 500-kw. rotary converter and three 100 k.v.a. oil-filled self-cooled transformers from Allis-Chalmers Company, Milwaukee.

The Oklahoma City (Okla.) Gas Engine Company, recently mentioned, has been incorporated for \$30,000. A factory is being built.

The Winchester Pump Company has been organized at Wincheste, Ind., to manufacture pumping machinery, including steam and gasoline engines of moderate capacity.

The Westinghouse Machine Company, Pittsburgh, works at West Homestead, Pa., has installed in the McKees Rocks plant

of the Pressed Steel Car Company an air compressor with a cross compound Corliss condensing steam end, a duplex compound air end and a 48-in. stroke. The compressor will be operated at 75 rev. per min and will have a piston displacement of 3600 cu. ft. of free air.

The Cambria Steel Company, Johnstown, Pa., has placed an order with the Allis-Chalmers Company for additional generating equipment. It will install a 3750 k.v.a. 2300-volt 25-cycle three-phase turbo-alternator. The turbine will operate under a steam pressure of 125 lb. with a 27-in. vacuum. A 50-kw. exciter will be coupled directly to the turbine shaft.

## Miscellaneous.

The Champion Machinery Company, Joliet, Ill., will enlarge its production facilities.

Power and cutting machinery will be installed by Morgan & Stansbie, Eugene, Ore., in a new plant.

Some extension will probably be made within the present year to the manufacturing facilities of the Cleveland Lock Company, Cleveland, Ohio, and additional tools provided.

Four boilers and a 500-hp. engine will be installed by the McCormick Company, McCormick, Wash. The contract has been placed with Caldwell Bros. Company, Tacoma, Wash.

The Northwest Harvester Company, Spokane, Wash., has bought the plant of the Spokane Harvester Company at that place, and will operate it to the full capacity of the present installation, which is likely to be augmented by spring.

The plant of the Fletcher Enameling Company, Anderson, Ind., which recently burned, will be rebuilt, probably for a larger output.

An addition to the plant of the Buckeye Traction Ditcher Company, Findlay, Ohio, will be erected within the next few months. Increased economy of production will be brought about by installation of improved machinery, electrically driven.

The site formerly occupied by the Dayton Hydraulic Machinery Company, Dayton, Ohio, has been acquired by the Dayton Computing Scales Company, which will put up a large manufacturing plant equipped with electric drive and modern apparatus for fire protection.

The Southern Motor Car Company has been organized at Florence, S. C., to build automobiles. For equipment details address F. M. Rogers, who will be manager.

The Portland Brazing & Machine Works, Portland, Ore., which is doing a large business at Northwestern points, will require some new equipment during the year.

The Croxton-Keeton Motor Company, Massillon, Ohio, is having plans drawn for an addition to its works.

The E. R. Thomas Motor Car Company will install a Bullock generator of 160 hp. to furnish direct current for operating machine tools in its plant.

The York Mfg. Company, York, Pa., which is doing a large business in tropical countries, will be compelled to make some further extensions to its works, either by means of new buildings or an increase in floor space, before the close of the present year.

New machinery is to be installed by the Reuter Hub & Spoke Company, Dexter, Mo., in a large wheel factory, which will replace one burned some weeks ago.

The Piper Machine Company has been organized at Indianapolis, Ind., to do a general machine manufacturing business. The capital stock is \$10,000; the directors, James C. Piper, Joseph W. Selvage and Lewis C. Walker.

The Hincher Mfg. Company of Salem, Ind., said to have one of the largest coat and suit hanger factories in the world, has equipped an additional factory at Washington, Ind., to take care of excess orders. The company has quadrupled its capacity since organization three years ago.

The Pullman Motor Car Company, York, Pa., has signed an agreement with the Evansville Business Association of Evansville, Ind., to locate an automobile plant there, with a capacity of at least 1000 cars a year. The company may also erect a motor-boat plant in connection.

The Auburn Automobile Company, Auburn, Ind., has increased its capital stock from \$25,000 to \$750,000. Charles Eckhart is president.

The Buckeye Jack Mfg. Company, Alliance, Ohio, having remodeled a local plant to suit its requirements, is now manufacturing the specialty mentioned in its title. Additional facilities will be provided later.

The American Dry Kiln Company has been organized at Indianapolis and incorporated with \$50,000 capital stock. The men interested in the new company were formerly connected with the National Dry Kiln Company, recently purchased by the Knight & Wilson Company of Indianapolis. The company will manufacture dry kilns and equipment, boilers, smokestacks, &c. Edward Gerrard is president and manager.

The factory of the National Adjustable Chair Company, Greenfield, Ind., recently destroyed by fire, will be rebuilt and on a larger scale.

The Hoosier Auto Company has been organized at Garrett, Ind., with \$80,000 capital stock, as manufacturer of autos. The directors are J. A. Moore, T. C. Little, J. B. Mager, Leigh Hunt, A. C. Widmer, J. A. Gingery, W. W. Sharpless and E. C. Reyher.

The Marshall Oil Company, manufacturer of lubricating oils, whose general offices are at Marshalltown, Iowa, with branches in several Western States, is making an addition to its factory and has the foundation laid for a new and up-to-date office.

The Birmingham Mfg. Company, Birmingham, Ala., has been organized with the following officers: James Gibbons, president; R. C. Rufus, vice-president; J. L. Travis, secretary and treasurer. It is the intention of this company to make a complete line of iron hand pumps, spray pumps and plumbers' cast brass goods. The new factory when completed will be 60 x 100 ft. All necessary equipment has been purchased.

The Haggard & Marcusson Company, manufacturers of spring beds, Chicago, Ill., has recently moved into its new factory at 1071-1081 West Thirty-seventh street, near Morgan street. The plot on which the building was erected is 125 x 550 ft., and a private siding from the Chicago Junction Railroad Company runs its entire length. The factory itself is a two-story and basement structure of standard mill construction equipped with a sprinkler system and covers about three-eighths of the entire plot. Electricity is used throughout for light and power, and each machine is equipped with an individual motor. The building is so situated as to afford daylight from all sides, and special light and ventilation are provided for the top floor by large skylights extending the entire length of the building.

Bigelow & Spring, Tampa, Fla., who intend making additions to their machine shop, will also install a brass foundry and later probably build dry dock and shipyard. This firm has recently designed a new gasoline marine motor.

The Jewett Car Company, Newark, Ohio, only lost its wood machine shop and one lumber shed in the recent fire at its plant, both fully covered by insurance. Rebuilding the machine shop has already commenced and machinery bought. Arrangements were made for promptly taking care of all work on hand.

A. J. Hawes & Son, brick manufacturers, Johnstown, Pa., are improving their plant by the installation of three wet pans, grinding pans, rock crushers and other additional equipment which will largely increase the capacity of the plant. An order was placed with Guy L. Andrews, Pittsburgh, representative of the Valley Iron Works, Williamsport, Pa., for a 325-hp. four-valve self-oiling automatic Lycoming steam engine to operate the plant.

The R. D. Nuttall Company, Pittsburgh, manufacturer of cut gears and pinions, has increased the capacity of its plant by the installation of considerable additional equipment, including automatic and turret lathes, cutting off machines and annealing furnaces. The company is well supplied with orders and is operating its plant double turn.

The Brush Runabout Company, Detroit, has let contract for erection of its automobile manufacturing plant, comprising seven buildings, at Massachusetts avenue and Oakland street. The iron and steel work went to Whitehead & Kales, Beecher avenue and Michigan Central Railroad.

The Michigan Buggy Company, Kalamazoo, Mich., will build a three-story and basement factory, 60 x 300 ft., concrete block construction.

It was stated in *The Iron Age* of December 18 that the Iroquois Iron Works, Buffalo, N. Y., was making some improvements in its crushing plant. This company is the machinery manufacturing department of the Barber Asphalt Paving Company, and it is the last named company that operates the crushing plant referred to.

#### The Jamison Coal & Coke Company Buys More Property.

The Jamison Coal & Coke Company, Pittsburgh, has purchased for \$3,350,000 the West Virginia property of the Georges Creek Coal & Iron Company, known as the Farmington plant. Included in the transaction are 7350 acres of the Pittsburgh seam coal, tipplers, shafts, cars, railroad sidings, houses, stores, 800 acres of surface land and 60 coke ovens. A second shaft under construction is down to the coal, and work is to be rushed to completion as rapidly as possible. More ovens will be built at once. The yearly output of the Farmington plant has been about 400,000 tons.

The Jamison Coal & Coke Company owns about 6000 acres of the Pittsburgh seam coal in the Greensburg basin of the Connellsville field, and has six plants there. It has about 1400 ovens on the property, and all during the depression managed to keep most of its

mines in operation. Early in 1909 it purchased 5400 acres from the Barricksville Coal & Iron Company, and is putting down two shafts on that property. Following this it bought from the Philadelphia & Reading Coal & Iron Company 1500 acres, and later bought 600 acres.

The property just purchased is located along the Wheeling Division of the Baltimore & Ohio Railroad, and is given the same shipping rate to Eastern markets as the coal in the Irwin field. This gives the Jamison Company 15,000 acres of holdings in the low sulphur district of Pennsylvania and West Virginia. With the cars purchased from the Georges Creek Coal & Iron Company, the company now has 1100 steel railroad cars. The Georges Creek Company was organized in 1836 by Maryland capitalists.

#### The Bessemer Pig Iron Association Gives a Dinner.

On the evening of December 29 the Executive Committee of the Bessemer Pig Iron Association gave a dinner to its members at the Union Club, Cleveland, Ohio. It was attended by representatives of all the furnaces comprising the association, some companies having three or four members present, and also by some special guests. Among the guests were: A. C. Dinkey, president, and Samuel A. Benner, sales manager, of the Carnegie Steel Company, Pittsburgh; W. P. Palmer, president of the American Steel & Wire Company, Cleveland; T. W. Guthrie, president of the Republic Iron & Steel Company, Pittsburgh, and W. H. Lewis, general manager of the new plant of the Jones & Laughlin Steel Company. J. G. Butler, Jr., of the Brier Hill Iron & Coal Company, Youngstown, made an admirable toastmaster. Addresses were made by James A. Campbell, president of the Youngstown Sheet & Tube Company, Youngstown, his subject being "Co-operation vs. Independence," W. P. Palmer, who spoke on "Right Thoughts," and Col. James H. Hoyt, a prominent attorney of Cleveland, whose subject was "Business and the Laws."

The arrangements for the dinner were in the efficient charge of Fayette Brown, Jr., grandson of Fayette Brown, a pioneer iron manufacturer of Cleveland, who has reached his eighty-seventh year, and Jay Pickands, son of Col. James Pickands of the firm of Pickands, Mather & Co., Cleveland. The menu card was artistically gotten up, the front page presenting steel engravings of an old style blast furnace, with stone base and stack, and a modern 500-ton stack. On an inside page was shown a picture of a Bessemer converter being blown.

The Executive Committee of the Bessemer Pig Iron Association consists of Samuel Mather, Pickands, Mather & Co., Cleveland; Edwin L. Ford, Youngstown Steel Company, Youngstown; Harvey L. Brown, Stewart Iron Company, Ltd., Sharon, Pa.; Frank B. Richards, M. A. Hanna & Co., Cleveland, and J. G. Butler, Jr., Brier Hill Iron & Coal Company, Youngstown. The association was organized at Youngstown 17 years ago, and is composed of a number of the merchant blast furnaces in the two valleys that sell their output of Bessemer and basic pig iron in the open market. The association has to do with labor and statistical matters, and has been most beneficial to its members. Joseph G. Butler, Jr., is commissioner of the association, and prepares its blast furnace statistics and other data.

The American Machine Company, Eau Claire, Wis., recently incorporated at \$50,000, has secured and equipped a plant for the manufacture of automobile appliances. J. C. Tanberg is president; F. R. Farr, vice-president; L. C. Brown, secretary; C. A. Tanberg, treasurer.

# The Iron and Metal Trades

## Pig Iron Production Stationary.

### All Markets Quiet but Inquiry is Increasing.

No year has ever been entered upon of which as much was expected as the iron trade now expects of 1910. At the beginning of no year has as large a volume of business been definitely under contract as the steel manufacturers have on their books to-day. For the past two months, at a year's end, production of pig iron and finished material has been at the highest rate ever reached. Opinion is practically unanimous that the consumption of iron and steel this year will be well beyond the surprising record of 1909.

At the same time all the optimistic predictions for the new year are tempered by the feeling that capital is still waiting for complete assurance on some points. That fact, as is well known, affects directly an important source of steel consumption—that springing from new enterprises and extensions.

The pig iron statistics for January 1 show that production was practically stationary in December. The heavy snowfall caused a shortage of coke at some furnaces, which, added to the holidays and an ore shortage at a few Alabama stacks, cut production somewhat below the expected amount. The total was 2,635,680 tons, or 85,022 tons a day, against 2,547,508 tons in November, or 84,917 tons a day. There were 313 furnaces active January 1, or 1 less than on December 1, and their weekly capacity was 595,216 tons, against 598,216 tons one month previous.

Large additions to pig iron and steel making capacity are to be reckoned with in 1910. Data gathered by *The Iron Age* show that 19 new blast furnaces were under construction or planned at the beginning of the year, representing a capacity of 2,650,000 tons a year. About 60 per cent. of this will be active this year.

Building of open hearth steel works is proceeding on a large scale. Such plants now building or on which work will soon begin represents 2,850,000 tons a year. One project likely to be definitely decided this month will increase this figure to 3,100,000 tons. About half this capacity will be available in the first half of 1910.

In the past week the pig iron market, while quiet, has shown less weakness, and in various directions inquiry is increasing. No large buying of foundry iron is looked for in January, but there is no lack of interest on the part of consumers. In the South the flooding of an iron mine has reduced the output of one important seller and, as this curtailment of ore supply may be prolonged, may give a firmer tone to the market for Alabama iron.

Pipe works have been buyers of pig iron both in the East and the Central West. In that trade the outlook is much improved, and a good many orders are in hand for spring shipment.

Sales of 9000 to 10,000 tons of basic iron were made in the Central West at \$17, furnace, for the first quarter, and \$17.25 for the second quarter.

After the heavy specifying of December and the steady buying of recent months, finished materials are comparatively inactive. In sheets and tin plates phenomenal buying keeps up.

The principal structural contract of the week was for 25,500 tons for the New York Municipal Building taken by the Pennsylvania Steel Company. Deliveries begin in June. The American Bridge Company will fabricate 8000 tons of steel for the new American Sheet & Tin Plate Company mills at Gary, Ind.

Chicago reports a sale of 20,000 tons of open hearth rails to a Western road and 10,000 tons of rails to another line. Some good rail orders are pending. Inquiries have come up at Chicago for 30,000 tons of plates and shapes for steel cars.

## A Comparison of Prices.

### Advances Over the Previous Month in Heavy Type, Declines in Italics.

At date, one week, one month and one year previous.

PIG IRON, Per Gross Ton : Jan. 5, Dec. 29, Dec. 1, Jan. 6, 1910. 1909. 1909. 1909.

Foundry No. 2, standard, Philadelphia	19.00	19.00	19.00	\$17.25
Foundry No. 2, Southern, Cincinnati	<i>17.25</i>	17.25	17.75	16.25
Foundry No. 2, local, Chicago	19.00	19.00	19.00	17.00
Basic, delivered, eastern Penn.	18.75	18.75	18.75	<i>16.75</i>
Basic, Valley furnace	<i>17.00</i>	17.00	17.25	15.50
Bessemer, Pittsburgh	19.00	19.00	19.90	17.40
Gray forge, Pittsburgh	17.40	17.40	17.40	15.40
Lake Superior charcoal, Chicago	19.50	19.50	19.50	19.50

### BILLETS, &c., Per Gross Ton :

Bessemer billets, Pittsburgh	27.50	27.50	27.50	25.00
Forging billets, Pittsburgh	31.00	31.00	31.00	27.00
Open hearth billets, Philadelphia	30.60	30.60	30.60	26.20
Wire rods, Pittsburgh	33.00	33.00	33.00	33.00
Steel rails, heavy, at mill	28.00	28.00	28.00	28.00

### OLD MATERIAL, Per Gross Ton :

Steel rails, melting, Chicago	17.25	17.25	17.25	14.50
Steel rails, melting, Philadelphia	<i>17.00</i>	17.00	18.00	17.50
Iron rails, Chicago	20.00	20.00	20.00	19.50
Iron rails, Philadelphia	<i>20.50</i>	20.50	21.00	21.25
Car wheels, Chicago	18.50	18.50	18.50	16.00
Car wheels, Philadelphia	<i>17.50</i>	17.50	17.50	16.00
Heavy steel scrap, Pittsburgh	<b>18.00</b>	18.00	17.50	16.75
Heavy steel scrap, Chicago	16.00	16.00	16.00	14.00
Heavy steel scrap, Philadelphia	<i>17.00</i>	17.00	18.00	17.50

### FINISHED IRON AND STEEL,

Per Pound :	Cents.	Cents.	Cents.	Cents.
Refined iron bars, Philadelphia	1.65	1.65	1.65	1.52
Common iron bars, Chicago	1.60	1.60	1.60	1.50
Common iron bars, Pittsburgh	1.70	1.70	1.70	1.50
Steel bars, tidewater, New York	1.66	1.66	1.66	1.56
Steel bars, Pittsburgh	1.50	1.50	1.50	1.40
Tank plates, tidewater, New York	1.71	1.71	1.71	1.76
Tank plates, Pittsburgh	1.55	1.55	1.55	1.60
Beams, tidewater, New York	1.71	1.71	1.71	1.76
Beams, Pittsburgh	1.55	1.55	1.55	1.60
Angles, tidewater, New York	1.71	1.71	1.71	1.76
Angles, Pittsburgh	1.55	1.55	1.55	<b>1.60</b>
Skelp, grooved steel, Pittsburgh	1.50	1.50	1.55	1.45
Skelp, sheared steel, Pittsburgh	1.60	1.60	1.60	1.50

### SHEETS, NAILS AND WIRE,

Per Pound :	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, Pittsburgh	<b>2.40</b>	2.40	2.30	2.50
Wire nails, Pittsburgh*	<b>1.85</b>	1.85	1.80	1.95
Cut nails, Pittsburgh	<b>1.85</b>	1.85	1.80	1.75
Barb wire, galv., Pittsburgh*	<b>2.15</b>	2.15	2.10	2.40

### METALS, Per Pound :

Per Pound :	Cents.	Cents.	Cents.	Cents.
Lake copper, New York	<b>14.00</b>	14.00	13.75	14.75
Electrolytic copper, New York	<b>13.75</b>	13.62½	13.25	14.25
Spelter, New York	6.30	6.30	6.40	5.20
Spelter, St. Louis	6.15	6.15	6.25	5.05
Lead, New York	<b>4.70</b>	4.70	4.40	4.20
Lead, St. Louis	<b>4.65</b>	4.65	4.25	4.10
Tin, New York	<b>33.40</b>	33.95	31.75	28.85
Antimony, Hallett, New York	<b>8.25</b>	8.25	8.12½	8.12½
Nickel, New York	45.00	45.00	45.00	<b>45.00</b>
Tin plate, 100 lb., New York	\$3.84	\$3.84	\$3.84	\$3.89

\* These prices are for largest lots to jobbers.

## Prices of Finished Iron and Steel F.O.B. Pittsburgh.

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16c.; Philadelphia, 15c.; Boston, 18c.; Buffalo, 11c.; Cleveland, 10c.; Cincinnati, 15c.; Indianapolis, 17c.; Chicago, 18c.; St. Paul, 32c.; St. Louis, 22½c.; New Orleans, 30c.; Birmingham, Ala., 45c. Rates to the Pacific Coast are 80c. on plates, structural shapes and sheets, No. 11 and heavier; 85c. on sheets, Nos. 12 to 16; 95c. on sheets, No. 16 and lighter; 65c. on wrought pipe and boiler tubes.

**Structural Shapes.**—I-beams and channels, 3 to 15 in., inclusive, 1.55c., net; I-beams over 15 in., 1.65c., net; H-beams over 8 in., 1.75c.; angles, 3 to 6 in., inclusive, 1/4 in. and up, 1.60c., net; angles over 6 in., 1.65c., net; angles, 3 x 3 in. and up, less than 1/4 in., 1.75c., base, half extras, steel bar card; tees, 3 in. and up, 1.65c., net; zees, 3 in. and up, 1.60c., net; angles, channels and tees, under 3 in., 1.50c., base, plus 10c., half extras, steel bar card; deck beams and bulb angles, 1.80c., net; hand rail tees, 2.80c., net; checkered and corrugated plates, 2.80c., net.

**Plates.**—Tank plates, 3/4 in. thick, 6 1/4 in. up to 100 in. wide, 1.55c. to 1.60c., base. Extras over this price are as follows:

Tank, ship and bridge quality, 1/4-in. thick on edges, 100 in. wide, down to but not including 6 in. wide, is taken as base.

Steel plates up to 72 in. wide, inclusive, ordered 10.2 lb. per square foot, shall be considered  $\frac{1}{4}$ -in. plate. Steel plates over 72 in. wide must be ordered  $\frac{1}{4}$ -in. thick on edge, or not less than 11 lb. per square foot, to take base price. Steel plates over 72 in. wide, ordered less than 11 lb. per square foot down to the weight of 3-16-in. shall take the place of 3-16-in.

Percentages as to overweight on plates, whether ordered to gauge or weight, to be governed by the Association of American Steel Manufacturers' Standard Specifications.

Gauges under $\frac{1}{4}$ -in. to and including 3-16-in. plates on thin edges.	\$0.10
Gauges under 3-16-in. to and including No. 8.	.15
Gauges under No. 8 to and including No. 9.	.25
All sketches (excepting straight taper plates varying not more than 4 in. in width at ends, narrowest end being not less than 30 in.)	.10
Complete circles.	.20
Boiler and flange steel plates.	.10
"A. B. M. A." and ordinary firebox steel plates.	.20
Still bottom steel.	.30
Marine steel.	.40
Locomotive firebox steel.	.50
Shell grade of steel is abandoned.	
For widths over 100 in. up to 110 in.	.05
For widths over 110 in. up to 115 in.	.10
For widths over 115 in. up to 120 in.	.15
For widths over 120 in. up to 125 in.	.25
For widths over 125 in. up to 130 in.	.50
For widths over 130 in.	1.00

TERMS.—Net cash 30 days. Pacific Coast base, 1.30c. f.o.b. Pittsburgh.

**Sheets.**—Minimum prices for mill shipments on sheets in carload and larger lots, on which jobbers charge the usual advances for small lots from store, are as follows: Blue annealed sheets, Nos. 3 to 8, 1.70c.; Nos. 9 and 10, 1.75c.; Nos. 11 and 12, 1.80c.; Nos. 13 and 14, 1.85c.; Nos. 15 and 16, 1.95c. Box annealed sheets, Nos. 17 to 21, 2.20c.; Nos. 22 to 24, 2.25c.; Nos. 25 and 26, 2.30c.; No. 27, 2.35c.; No. 28, 2.40c.; No. 29, 2.45c.; No. 30, 2.55c. Galvanized sheets, Nos. 13 and 14, 2.50c.; Nos. 15 and 16, 2.60c.; Nos. 17 to 21, 2.75c.; Nos. 22 to 24, 2.90c.; Nos. 25 and 26, 3.10c.; No. 27, 3.30c.; No. 28, 3.50c.; No. 29, 3.60c.; No. 30, 3.85c. Painted roofing sheets, No. 28, \$1.70 per square. Galvanized roofing sheets, No. 28, \$3 per square, for  $2\frac{1}{2}$ -in. corrugations.

**Wrought Pipe.**—The following are the discounts on the Pittsburgh basing card on carloads of wrought pipe adopted by the leading mills which go into effect January 1:

	Steel.		Iron.	
	Black.	Galv.	Black.	Galv.
$\frac{1}{8}$ and $\frac{1}{4}$ in.	.70	.54	.65	.52
$\frac{3}{8}$ in.	.71	.57	.66	.52
$\frac{1}{2}$ in.	.74	.62	.69	.57
$\frac{5}{8}$ to $\frac{3}{4}$ in.	.78	.68	.73	.63
7 to 12 in.	.72	.57	.68	.53
Plugged and Reamed.				
1 to 4 in.	.76	.66	.71	.61
Extra Strong, Plain Ends.				
$\frac{1}{8}$ to $\frac{3}{8}$ in.	.63	.51	.58	.46
$\frac{1}{4}$ to 4 in.	.70	.58	.65	.53
$\frac{5}{8}$ to 8 in.	.66	.54	.61	.49
Double Extra Strong, Plain Ends.				
$\frac{1}{4}$ to 8 in.	.59	.48	.54	.43

The above steel pipe discounts are for "card weight," subject to the usual variation of 5 per cent.

**Boiler Tubes.**—Discounts on lap welded steel and charcoal iron boiler tubes to jobbers in carloads are as follows:

	Steel.	Iron.
1 to $1\frac{1}{2}$ in.	.49	.43
$1\frac{1}{2}$ to $2\frac{1}{4}$ in.	.61	.43
$2\frac{1}{2}$ in.	.63	.48
$2\frac{1}{2}$ to 5 in.	.69	.55
6 to 13 in.	.60	.43
$2\frac{1}{2}$ in. and smaller, over 18 ft., 10 per cent. net extra.		
$2\frac{1}{2}$ in. and larger, over 22 ft., 10 per cent. net extra.		

To destinations east of the Mississippi River will be sold at delivered discount for carloads lowered by two points, for lengths 22 ft. and under; longer lengths, f.o.b. Pittsburgh.

**Wire Rods.**—Bessemer, open hearth and chain rods, \$33.

**Steel Rivets.**—Structural rivets, 2.15c., base; boiler rivets, 2.25c., base, subject to usual extras.

## Pittsburgh.

PARK BUILDING, January 5, 1910.—(By Telegraph.)

**Pig Iron.**—A more active inquiry is experienced for basic and foundry iron. The Carbon Steel Company of this city has bought 9000 to 10,000 tons of basic from dealers at \$17, Valley furnace, for first quarter delivery, and \$17.25 for second quarter. Another consumer has bought 1500 tons for first quarter at \$17, Valley furnace, for delivery in the Wheeling District. A sale of 1000 tons of No. 2 foundry has been made for first quarter delivery at about \$17, Valley furnace. Prices on basic are decidedly firmer, and some sellers are holding to \$17.25 at furnace for first quarter delivery, but some can still be had through dealers at \$17, at furnace. We quote standard Bessemer iron, \$19, for delivery over first half of next year; basic, \$17, for delivery in first quarter; malleable Bessemer, \$17.25; No. 2 foundry, \$17, and gray forge, \$16.50, all at Valley furnace, the freight rate to the Pittsburgh District being 90c. a ton.

**Steel.**—There is very little new buying of Bessemer or open hearth billets or sheet and tin bars, but the supply of steel seems to be larger, as the mills are making quicker deliveries. A fairly active demand is observed for small open hearth billets and several sales have been made at about \$30, maker's mill. We also note sales of 6000 to 8000 tons of sheet and tin bars for first quarter delivery, on the basis of about \$29, maker's mill. We quote \$27.50 for Bessemer billets and \$28 to \$28.50 for open hearth, maker's mill; sheet and tin bars for first quarter \$29, maker's mill; forging billets, \$31 to \$32, maker's mill.

(By Mail.)

Negotiations are now on between several of the leading railroads and the mills on large contracts for rails, and it is expected that within a week or two some nice orders will be given out. The pig iron market is showing more life and inquiries for basic and foundry have been more active in the past two weeks than for some time. There is not much inquiry for Bessemer iron, leading consumers being pretty well covered. The starting of the new furnace of the Jones & Laughlin Steel Company at Aliquippa will help this company very considerably, the stack having turned out about 8000 tons in December, and will do better this month. The company at its seven blast furnaces now operating made nearly 100,000 tons of Bessemer iron in December, which about represents its consumption. The steel market is quiet, but prices are firm. Bessemer billets are held by makers at \$27.50 to \$28, but some resales have been made to dealers at about \$27 at mill. Open hearth billets are \$28 to \$28.50, at maker's mill. Sheet and tin bars for first quarter are held at \$29, at maker's mill, and a leading Valley producer has sold a considerable tonnage at that price. In sheet and tin plate the demand is still heavy, actual bookings of the mills in the last quarter of 1909 breaking all former records. The scrap trade is quiet, but is expected to pick up this month. There is but little inquiry for furnace or foundry coke, most consumers being covered for first half. While the general situation is quiet, when compared with the great activity in October, November and early December, the situation is strong and there is no apprehension that there will be any recession in prices. On the contrary, advances are looked for shortly on several lines of finished iron and steel, notably plates and plain structural material.

**Ferromanganese.**—Several consumers are now figuring on the purchase of fair sized lots for delivery in the next two or three months. The market is only fairly firm. We quote 80 per cent. foreign at \$44.50, seaboard, for first quarter, and \$45 to \$46 for first half, the freight rate to Pittsburgh being \$1.95 a ton.

**Ferrosilicon.**—No sales of moment have been made the past week, but some fair sized inquiries are out. Prices are not as firm as they were some time ago. We quote 10 per cent. at \$23.90; 11 per cent., \$24.90; 12 per cent., \$25.90, and 50 per cent., \$62 to \$62.50, Pittsburgh, for prompt shipment.

**Muck Bar.**—The situation is quiet but strong. We quote best grades of muck bar in long lengths, made from all pig iron at \$30, while light bars cut to length are held at about \$30.25, Pittsburgh.

**Wire Rods.**—There is a fair amount of new inquiry, but most consumers of rods covered their requirements some time ago, when prices were lower than they are now and are specifying liberally against these contracts. The market is firm, and we quote Bessemer, open hearth and chain rods at \$33, Pittsburgh, for delivery over the next two or three months.

**Skelp.**—The situation is quieter and quicker deliveries can be had, as the mills have pretty well caught up on back orders. We quote grooved steel skelp at 1.50c. to 1.55c.; sheared steel skelp, 1.60c. to 1.65c.; grooved iron skelp, 1.75c. to 1.80c., and sheared iron skelp, 1.90c., all for ordinary widths and gauges, f.o.b. Pittsburgh.

**Steel Rails.**—Active negotiations are on between the rail mills and several of the leading railroads for heavy tonnages of rails, and it is expected that within a week or two some good sized contracts will be placed. There is a continued active demand for light rails, and the Carnegie Steel Company received in the past week orders for over 3500 tons. We quote steel axles at 1.75c. to 1.80c., and splice bars, 1.50c., at mill, Pittsburgh. Light rail prices are

as follows: 8 to 10 lb., \$32; 12 to 14 lb., \$29; 16, 20 and 25 lb., \$28; 30 and 35 lb., \$27.75, and 40 and 45 lb., \$27, Pittsburgh. These prices are for 250-ton lots and over, and for small lots premiums of 50c. per ton and more are being paid. We quote standard sections at \$28, at mill.

**Plates.**—The Great Northern Railroad has placed an order for 1000 steel cars. The Carnegie Steel Company will furnish about 15,000 tons of plates and shapes for the 1500 steel cars recently ordered by the Duluth, Missabe & Northern and Duluth & Northern railroads. The inquiry of the Cincinnati, Hamilton & Dayton for 1500 freight cars with steel underframes has not yet been placed. The leading plate mills are pretty well filled up with orders for the next two or three months. The engagements of the Carnegie Steel Company with the steel car companies and other heavy consumers of plates are so heavy that its entire output of plates for the first half of this year may be said to be practically under contract. The market is firm, and we quote  $\frac{3}{4}$ -in. and heavier plates at 1.55c. in large lots and 1.60c. to 1.65c. in small lots for prompt shipment.

**Structural Material.**—Actual bookings of the American Bridge Company in December were considerably over 50,000 tons, which is more than its monthly capacity. This company has taken the contract for the steel buildings for the new sheet, tin plate, jobbing and plate mills to be erected by the American Sheet & Tin Plate Company at Gary, Ind., and has also taken 4000 tons for buildings for the new open hearth steel plant of the American Rolling Mill Company at Middletown, Ohio. The Basic Steel Company, which will build a new open hearth plant at Niles, Ohio, is in the market for about 1000 tons. The biggest job on the market is the Montreal Bridge, which it is estimated will take close to 60,000 tons. Several of the local structural concerns have representatives in Montreal this week looking after this important work. Deliveries by the mills are still very unsatisfactory, and are fully six weeks to two months behind. We quote beams and channels up to 15-in. at 1.55c., at mill, while small lots for spot shipment bring 1.60c. to 1.65c., at mill.

**Tin Plate.**—This week the American Sheet & Tin Plate Company is operating about 82 per cent. of its serviceable tin mill capacity and is steadily increasing its output. The demand for tin plate holds up remarkably well. The leading mills now have enough contracts on their books to take practically their entire output for three months, and a good part of it through the second quarter. The Pope, McKeesport, Standard, Follansbee and Phillips companies all report active conditions in the tin plate market and believe that 1910 will be the biggest year in the consumption of tin plate that the country has ever known. The new eight-mill plant of the Phillips Sheet & Tin Plate Company, at Weirton, W. Va., is nearly finished, and is expected to go in operation late this month or early in February. The market is firm. We quote 100-lb. cokes at \$3.60 per base box, f.o.b. Pittsburgh, for delivery through the first quarter and half.

**Sheets.**—Actual orders for sheet and tin mill products entered by the American Sheet & Tin Plate Company in December were only slightly less than in December, 1906, which stands as a record month for this concern, but the orders entered in the last three months of 1909 were much the heaviest in any quarter in the history of the company. This company is now operating all its sheet mills to full capacity, with the single exception of the Aetna-Standard Works at Bridgeport, which is still idle. The new demand for sheets continues enormously heavy; order books of the mills are crowded and they are far behind in shipments. Several leading makers state that they are turning down nice specifications almost every day, being unable to take on the business and make the deliveries wanted by customers. It is claimed that there is absolutely no shading in prices. We quote: Blue annealed sheets, Nos. 3 to 8, 1.70c.; Nos. 9 and 10, 1.75c.; Nos. 11 and 12, 1.80c.; Nos. 13 and 14, 1.85c., and Nos. 14 and 15, 1.95c.; one-pass box annealed No. 28 black sheets, 2.40c., and No. 28 galvanized, 3.50c., at mill. We quote corrugated roofing sheets at \$1.70 per square for painted and \$3 for galvanized,  $\frac{1}{2}$ -in. corrugations. Jobbers charge the usual advances over these prices for small lots from store.

**Bars.**—Specifications in iron and steel bars entered by the mills in December were a record breaker, due to the fact that many of these contracts were taken some time ago at lower prices than are ruling now, and specifications were hurried forward for fear of cancellation. The new demand for both iron and steel bars is rather light, but this is due to the fact that consumers are covered by contracts, some of which run up to July 1. A local interest has taken a contract from a leading consumer for 12,000 tons of steel bars for shipment during first quarter on a sliding scale basis. On contracts for steel bars for delivery in first quarter and first half of this year the mills are naming about 1.44c., at mill. For prompt shipment steel bars are held at 1.50c. to 1.55c., at mill, and considerable tonnage is being booked at these prices by mills that are in position to make reasonably early shipments. We quote iron bars at 1.70c., Pittsburgh, for delivery over the next two or three months.

**Hoops and Bands.**—Not many new orders are being placed, but specifications against contracts are coming in at a fairly satisfactory rate. We quote steel hoops for forward delivery at 1.50c. to 1.55c., and for prompt shipment at 1.60c. to 1.65c., at mill. Steel bands are firm at 1.45c. to 1.50c., on contracts for forward delivery, and 1.55c. to 1.60c. for reasonably prompt shipment.

**Spelter.**—The demand is reported slightly better. A local consumer bought 200 tons of prime Western at 6.10c., East St. Louis, or 6.22 $\frac{1}{2}$ c., Pittsburgh. We quote 6.10c. to 6.12 $\frac{1}{2}$ c., f.o.b. cars East St. Louis, the freight to Pittsburgh being 12 $\frac{1}{2}$ c. per 100 lb.

**Spikes.**—New buying is quiet but the makers have a fair amount of business on their books, about sufficient to carry them through the next two or three months. We quote standard sizes of railroad spikes,  $4\frac{1}{2}$  x 9-16 in. and larger, at \$1.80 to \$1.85 for first quarter. Boat spikes are firm, at \$1.80, base, and small railroad spikes at \$1.80, base. These prices are for carload and larger lots, 10c. per keg advance being charged for small lots.

**Shafting.**—New business is light, most consumers being covered by contracts placed some time ago, against which they are specifying freely. Discounts on shafting remain on the basis of 55 per cent. off in carloads and 50 per cent. in less than carloads, delivered in base territory.

**Rivets.**—The demand for rivets is only fair, being confined mostly to small lots, consumers having covered future requirements some time ago at lower prices than are ruling now. We quote: Structural rivets,  $\frac{3}{4}$  in. and larger, 2.15c., base; cone head boiler rivets,  $\frac{3}{4}$  in. and larger, 2.25c., base;  $\frac{5}{8}$  in. and 11-16 in. take an advance of 15c., and  $\frac{1}{2}$  in. and 9-16 in. take an advance of 50c.; in lengths shorter than 1 in. also take an advance of 50c. Terms are 30 days, net cash, f.o.b. mill. The above prices are absolutely minimum on contracts for large lots, makers charging the usual advances of \$2 to \$3 a ton to the small trade.

**Wire Products.**—Since the first of the year the demand for wire nails on the \$1.85 basis has been fairly active, but for cut nails is rather quiet. There is not much new demand for galvanized or fence wire, but this is expected to improve as soon as spring trade opens up, which will be in the near future. We quote wire nails at \$1.85 in carload and larger lots; painted barb wire, \$1.85; galvanized, \$2.15; annealed fence wire, \$1.65; galvanized, \$1.95, and cut nails, \$1.85, all f.o.b. cars, Pittsburgh, usual terms, with full freight to destination added.

**Merchant Pipe.**—The new card of Pittsburgh basing discounts, sent out by the leading pipe mills last week and effective from January 1, has been well received by the trade, which believes it will be a good thing for all concerned and will remove some of the inequalities that existed in the old list. New orders for tubular goods entered by the mills in December were fairly heavy, the tonnage taken by one leading mill being the heaviest in any one month in a long time. It is believed that the demand for the larger sizes of pipe this year will be enormously heavy, as some gas and oil line projects are under way that will require a very large tonnage. The new table of discounts is printed on another page in this issue.

**Boiler Tubes.**—Locomotive and merchant tubes are in heavier demand. The bookings by the mills in December were very satisfactory and much larger than in the same month a year ago.

**Iron and Steel Scrap.**—This market has been very quiet, and weakness in prices has developed on certain lines of scrap, some dealers having had material loaded on cars which they were compelled to move and named slightly lower prices to effect sales. It is believed that the demand will improve this month. Dealers quote about as follows: Heavy steel scrap for delivery at leading consuming points, such as Monessen, Steubenville, Sharon, Follansbee, Brackenridge and Pittsburgh, \$18 to \$18.25, delivered. No. 1 cast scrap is held at about \$16.50 and No. 2 at about \$15.50; low phosphorus melting stock, \$21 to \$21.25; bundled sheet scrap, \$16.25 to \$16.50; rerolling rails, \$18.50 to \$18.75, for delivery at Cumberland, Md., Cambridge or Newark, Ohio; railroad malleable, \$16 to \$16.25; No. 1 busheling, \$15.50; No. 2, \$12.50; grate bars, \$14 to \$14.25; locomotive axles, \$28 to \$28.25; iron axles, \$27.25 to \$27.50; steel axles, \$21.50 to \$21.75; No. 1 railroad wrought scrap, \$19 to \$19.50; old car wheels, \$18 to \$18.25; cast iron borings, \$10.50 to \$10.75; machine shop turnings, \$12.50 to \$12.75; sheet bar crop ends, \$18.75 to \$19. All the above prices are per gross ton, f.o.b. Pittsburgh.

**Coke.**—There is but little new demand for either furnace or foundry coke, consumers being covered for the first half of this year or longer, while prices are weaker. A sale is reported of 50 cars of high grade furnace coke for spot shipment at \$2.75 at oven, but this price is regarded as slightly above the market. We quote standard grades of furnace coke for prompt shipment at \$2.60 to \$2.65 per net ton at oven, while on contracts for first half about \$2.75 is quoted. Best grades of 72-hour foundry coke are held at \$3 to \$3.25 per net ton at oven.

## Chicago.

FISHER BUILDING, January 5, 1910.—(By Telegraph.)

The year opens with the market for steel products very strong in every direction. Complaints regarding deliveries are increasing in number and intensity, and, while it is not always possible to distinguish between buyers who are actually in need and those who are merely looking to the future, there is no doubt that the shortage in steel products is becoming more acute in certain lines. There is complaint regarding deliveries of sheets on specifications given last fall, and it is very difficult to make the supply of special steels meet the consumptive demand for agricultural implements and other industrial purposes. Buyers of bars who were supposed to have made contracts far in excess of their requirements when prices were low last spring have found that their business has exceeded all estimates, and they have had to come back in the market with second orders, which have been placed at current market prices. New business is coming forward steadily in plates and structural shapes for steel cars, and there appears to be no limit in the expansion of the demand for steel buildings. Last week it was estimated that the structural business in buildings and bridges in Western territory, not under contract, but in prospect, amounted to 200,000 tons, and the past week's developments have added a respectable percentage to this figure. In the face of this enormous demand prices were somewhat irregular in December on fabricated material. This was due to the fact that fabricators had contracts for steel which they wanted to cover with specifications before the end of the year, and it is believed they will now obtain prices corresponding to the current value of structural shapes. Large second orders for rails are coming forward steadily. Many consumers of billets who formerly depended on local mills are obliged to seek elsewhere, and this is also true of rods. It is understood that industrial buyers of rods and wire will soon be able to contract for their requirements to July 1, the jobbing trade in wire products being limited to 60 days.

**Pig Iron.**—The monotonous dullness of the pig iron market has been relieved the past week by a number of sales of Southern foundry and southern Ohio iron, and prices have stiffened a little in the weak spots. For several weeks buyers have been very indifferent to offers of Southern foundry iron at \$14, Birmingham, for first half, and southern Ohio No. 2 was offered in this territory recently at \$16.50 at furnace, equivalent to \$18.90, Chicago. This week the minimum reported for Southern No. 2 is \$14 for the current quarter, \$14.25 for second quarter and \$14.50 for third quarter, with only a limited amount of iron available at these figures, and most of the furnaces asking \$14.50 for first half. The minimum now reported for southern Ohio is \$17 at furnace, equal to \$19.40, Chicago. A fair tonnage of Southern iron has been sold in territory controlled by Chicago offices of the furnace interests and inquiries are coming in more freely, a few buyers beginning to show interest in third quarter iron. An Ohio pipe interest is reported having purchased 7000 tons of first half Southern iron with inquiries pending for 6000 tons of Northern iron, the decision wavering between Valley and southern Ohio. In Northern foundry iron the market is very quiet. An inquiry from Grand Rapids, Mich., for 1000 tons of No. 2 foundry is reported, and there are other scattering inquiries. Spot Southern iron, which demoralized the market during November and December, is no longer mentioned, and it is understood that in some cases the furnaces have readjusted contracts to carry over iron that was being resold. On the other hand, there are more requests from foundries to anticipate shipments on their contracts. Southern Ohio silvery irons have been advanced \$1, making the quotation for 8 per cent., Chicago delivery, \$22.40 for first quarter and \$22.90 for second quarter. The following quotations are for January, February and March delivery, f.o.b. Chicago:

Lake Superior charcoal	\$19.50 to \$20.00
Northern coke foundry, No. 1	19.50 to 20.00
Northern coke foundry, No. 2	19.00 to 19.50
Northern coke foundry, No. 3	18.50 to 19.00
Northern Scotch, No. 1	19.00 to 19.50
Southern coke, No. 1	18.85 to 19.35
Southern coke, No. 2	18.35 to 18.85
Southern coke, No. 3	17.85 to 18.35
Southern coke, No. 4	17.60 to 18.10
Southern coke, No. 1 soft	18.85 to 19.35
Southern coke, No. 2 soft	18.35 to 18.85
Southern gray forge	17.35 to 17.85
Southern mottled	17.10 to 17.60
Malleable Bessemer	19.00 to 19.50
Standard Bessemer	21.40 to 21.90
Jackson Co. and Kentucky silvery, 6%	21.40 to 21.90
Jackson Co. and Kentucky silvery, 8%	22.40 to 22.90
Jackson Co. and Kentucky silvery, 10%	23.40 to 23.90

(By Mail.)

**Billets.**—Many consumers who have been obtaining billets from local sources heretofore have had to seek elsewhere on the termination of their contracts. One local consumer was fortunate recently in obtaining a 500-ton lot of forging billets from an Eastern mill at \$32.50, Chicago, but as a

rule buyers have to pay \$35 for forging billets and diligent search is necessary to obtain them at that figure.

**Rails and Track Supplies.**—The Illinois Steel Company sold about 25,000 tons of rails last week, as the end of 1909 sales. Of this amount about 20,000 tons represented open hearth rails taken by a Western road. The Baltimore & Ohio business is still pending, but may be closed this week. About 75 per cent. of the rail business from Western roads contracted during the past year has called for 90-lb. rails. In many cases the roads are taking up 80 and 85 lb. rails on their main lines and laying new rails, as a precaution against breakage under main line passenger traffic. Several roads have ordered 5000 ton lots of ferrotitanium rails, which have given very favorable results in service, and tests are also being made by the principal Western lines of rails made from steel refined in the Heroult electric furnace at the South Works. There is every prospect that the rail mills in this district will have enough business to keep them running through the year, and the demand for angle bars is so heavy that some of the capacity of the new merchant mill at Gary will be required for this business. We quote standard railroad spikes at 1.80c., base; track bolts and square nuts, 2.30c. to 2.50c., base, all in car-loads, Chicago. Light rails, 40 to 45 lb., \$26; 30 to 35 lb., \$26.75; 16, 20 and 25 lb., \$27; 12 lb., \$28, Chicago, less 50c. a ton on lots of 500 tons and \$1 a ton on lots over 500 tons.

**Structural Material.**—It is estimated that the production of fabricated material in 1909 was equal to 1907 and was exceeded in only one preceding year, 1906. During the first half of 1909, however, the fabricating shops had but little business, and when the rush came on many fabricators could not get material from the mills to keep them going at full capacity. It is the general expectation that 1910 will break all records, with a possible production of 2,000,000 tons, to be used in buildings and bridges, not including structural shapes, which go into cars and ships. The capacity of the structural mills has been largely increased, especially in light sections, where there has been the greatest delay. A large tonnage of heavy sections has been held at the mills awaiting shipment because the fabricators could not get the light material required to complete contracts. During December the prices obtained by fabricators were not in line with current quotations from the mills for structural shapes, owing to efforts to obtain contracts that would cover material due them at old prices from the mills, but it is believed that this irregularity was only temporary and is now at an end. Only a few small lettings were booked last week. The American Bridge Company took 410 tons for repair shops for the Duluth, Missabe & Northern Railroad, 346 tons of plate girder bridges for the Atchison, Topeka & Santa Fe, and 252 tons of building work for the Giroux mines, at Ely, Nev. The Spokane Realty Building, Spokane, Wash., 390 tons, went to the Northwestern Steel Company, Portland, Wash. We quote plain material from mill, 1.78c. to 1.88c., Chicago; from store, 2c., Chicago.

**Plates.**—The plate mills in this district are now running principally on contracts for steel cars, the ship plate business on the books having been finished up recently. New business is neither sought nor welcome, but it is understood that there is an inquiry in the market for 30,000 tons of plates and structural material for steel cars. Prices are very firm. We quote mill prices at 1.78c. to 1.88c., Chicago; store prices, 2c., Chicago.

**Sheets.**—The inquiry for blue annealed sheets has exceeded the available supply for several weeks, and the local independent mill obtains a premium of \$1 to \$2 per ton over schedule prices for Chicago delivery. We quote mill prices as follows, Chicago: No. 10 blue annealed, 1.93c.; No. 28 black, 2.58c.; No. 28 galvanized, 3.68c. Prices from store, Chicago, are: No. 10 blue annealed, 2.25c. to 2.35c.; No. 28 black, 2.90c. to 3c.; No. 28 galvanized, 4c. to 4.10c.

**Bars.**—The year opens with prices very firm, and it is understood that Eastern mills which have been shading the Chicago price on attractive business, on which they were doing 1.45c., Pittsburgh, have raised their minimum to 1.50c., which is in line with the price that has been quoted here for some time. Agricultural implement makers, who were generally supposed to have bought more than a year's requirements last spring, find that their business is exceeding their expectations and in several cases they have already come into the market for additional quantities, for which they have had to pay current prices. The bar iron market is quiet. Subject to the usual delay in delivery on soft steel bars, we quote as follows: Soft steel bars, 1.68c. to 1.78c.; bar iron, 1.60c. to 1.65c.; hard steel bars rolled from old rails, 1.58c. to 1.65c., all Chicago.

**Rods and Wire.**—Rods are about as scarce as billets, and buyers have difficulty in covering their requirements except from mills for which they are old and strictly regular customers. The mills are taxed to supply the demand from the manufacturing trade for rods and plain wire. Buyers of this class of material have only been covered for their requirements to April 1, but it is understood that contracts

will be taken very shortly, perhaps this week, for shipment up to July 1. Jobbers' carload prices, which are quoted to manufacturing buyers, are as follows: Plain wire, No. 9 and coarser, base, 1.83c.; wire nails, 2.03c.; painted barb wire, 2.03c.; galvanized, 2.33c., all Chicago.

**Merchant Steel.**—There is a good deal of complaint from manufacturers that they cannot get shipments of merchant steel to keep pace with their needs, as the demand has exceeded all previous records. Prices are very firm.

**Cast Iron Pipe.**—Business was light between the holidays, no lettings of any moment being reported. Prices are firm, as the cost of production will be higher in 1910 than last year. On current business we quote, per net ton, Chicago, as follows: Water pipe, 4-in., \$28.50; 6 to 12 in., \$27.50; 16-in. and up, \$26.50, with \$1 extra for gas pipe.

**Metals.**—Copper is stronger this week in the Chicago market, and in quite active demand, casting copper being firm at 13½c. and lake at 14c. Tin is a shade lower, except for small lots, for which the prices of the preceding week are asked. There is a considerable spread in spelter between the prices that the casual carload buyer must pay and those at which large regular buyers can obtain round lots. We quote as follows: Casting copper, 13½c.; lake, 14c., in carloads, for prompt shipment; small lots, ¼c. to ¾c. higher; pig tin, car lots, 34c.; small lots, 36c. to 37c.; lead, desilverized, 4.75c. to 4.80c., for 50-ton lots; corrodin, 5c. to 5.05c., for 50-ton lots; in carloads, 2½c. per 100 lb. higher; spelter, 6.20c. to 6.25c.; Cookson's antimony, 10½c., and other grades, 9½c. to 10½c.; sheet zinc is \$8, f.o.b. La Salle, in car lots of 600-lb. casks. On old metals we quote: Copper wire, crucible shapes, 13½c.; copper bottoms, 12c.; copper clips, 13½c.; red brass, 12½c.; yellow brass, 10c.; light brass, 7c.; lead pipe, 4½c.; zinc, 5.25c.; pewter, No. 1, 23c.; tin foil, 26c.; block tin pipe, 28c.

**Old Material.**—The trade continues quiet, with only a nominal amount of material in transit. The railroads are all short of motive power to handle their traffic under the conditions that have prevailed for several weeks. Cars loaded with scrap are about the last to be moved under such conditions, so there is practically no scrap pressing on the market for disposition, and the physical movement may be very light until the weather relaxes. Prices remain practically unchanged. The following prices are per gross ton, delivered, Chicago:

Old iron rails.....	\$20.00 to \$20.50
Old steel rails, rerolling.....	18.00 to 18.50
Old steel rails, less than 3 ft.....	17.25 to 17.75
Rebating rails, standard sections, subject to inspection.....	23.50 to 24.50
Old car wheels.....	18.50 to 19.00
Heavy melting steel scrap.....	16.00 to 16.50
Frogs, switches and guards, cut apart.....	16.00 to 16.50
Shoveling steel.....	15.50 to 16.00

The following quotations are per net ton:

Iron angles and splice bars.....	\$17.50 to \$18.00
Iron car axles.....	21.50 to 22.00
Steel car axles.....	20.50 to 21.00
No. 1 railroad wrought.....	14.75 to 15.25
No. 2 railroad wrought.....	13.75 to 14.25
Springs, knuckles and couplers.....	14.75 to 15.25
Locomotive tires, smooth.....	18.50 to 19.00
No. 1 dealers' forge.....	12.50 to 13.00
Steel axle turnings.....	12.00 to 12.50
Machine shop turnings.....	10.50 to 11.00
Cast and mixed borings.....	7.50 to 8.00
No. 1 busheling.....	12.75 to 13.25
No. 2 busheling.....	9.75 to 10.25
No. 1 boilers, cut to sheets and rings.....	11.50 to 12.00
No. 1 cast scrap.....	14.50 to 15.00
Stove plate and light cast scrap.....	12.50 to 13.00
Railroad malleable.....	15.00 to 15.50
Agricultural malleable.....	13.00 to 13.50
Pipes and flues.....	11.50 to 12.00

### Birmingham.

BIRMINGHAM, ALA., January 3, 1910.

**Pig Iron.**—A fairly attractive tonnage was involved in transactions of the past week. Notwithstanding the fact that comparatively small lots were engaged and that the demand represented was of a very desultory nature, it is believed that prices considered were more uniform than during the week previous. The schedule of \$14, Birmingham, on a No. 2 foundry basis for first quarter shipments is apparently firmly established. There is some rumor of spot deliveries having sold at lower figures, but so far such sales are without confirmation. The leading producing interest adheres to its former position as to deliveries in the first half and remains out of the market by reason of prohibitive asking prices, while the second largest concern now announces only a limited tonnage available at prevailing prices for shipment prior to the beginning of the second half. Neither concern referred to has indicated its position as to deliveries in the second half. All the producers who are solicitous of additional orders at prevailing prices quote an advance of 50 cents over the \$14 basis for deliveries to cover the entire first half. Latest records are without such engagements and there is some question as to just what price would be acceptable to the majority of sellers. In no case

have order books been opened for second half commitments, and the price for deliveries within that period is probably more undetermined by reason of the fact that sales resulting from several bona fide inquiries now pending will depend largely upon terms of delivery for the tonnage engaged. Reports as to the aggregate stock accumulation on furnace yards are not yet available, and by reason of recent changes in furnace operations it is likely that efforts to dispose of the make of the last half of this year will be deferred longer than has been expected. There are now three less furnaces in operation on foundry iron than on December 1, with prospects of only one additional being blown in, in the near future. An addition is also soon to be made to the output of basic.

**Cast Iron Pipe.**—The outlook in this market is considered very gratifying, although no lettings of importance other than have been mentioned are reported. Local plants have in all cases resumed operations after the usual suspension for the holidays, and the output is normal. It is understood that orders becoming effective with the beginning of the new year will result in a movement from all plants that will practically clean up stock accumulations and that without exception the tonnage to be produced within the next few months will apply to orders actually in hand. There has been no change in prices and the market is believed to be firm at the figures quoted as follows for water pipe, f.o.b. cars here per net ton: 4 to 6 in., \$26; 8 to 12 in., \$25; over 12 in., average, \$24, with \$1 per ton extra for gas pipe.

**Old Material.**—This market is very quiet, with all parties concerned apparently content to await developments in pig iron. The movement from local yards is about equal to the receipts, and dealers do not complain. Prices as last quoted are being adhered to, but are in the main nominal. We quote dealers' asking prices as follows per gross ton, f.o.b. cars here:

Old iron axles.....	\$20.00 to \$20.50
Old iron rails.....	16.00 to 16.50
Old steel axles.....	19.00 to 19.50
No. 1 railroad wrought.....	14.50 to 15.00
No. 2 railroad wrought.....	12.00 to 12.50
No. 1 country wrought.....	11.50 to 12.00
No. 2 country wrought.....	11.50 to 12.00
No. 1 machinery.....	13.00 to 13.50
No. 1 steel.....	12.25 to 12.75
Tram car wheels.....	12.50 to 13.00
Standard car wheels.....	14.50 to 15.00
Light cast and stove plate.....	10.50 to 11.00
Cast borings.....	6.50 to 7.00

### Philadelphia.

PHILADELPHIA, PA., January 4, 1910.

Matters pertaining to the closing of the year's business have claimed the greater share of the trade's attention and the markets have been quiet, as is usual at this season. The blizzard of 10 days ago interfered considerably with the transaction of business of all kinds, transportation facilities not reaching normal conditions until late in the past week. Most optimistic views are expressed regarding the volume and character of business in the coming year. Producers of both crude and finished materials are well booked ahead, and still refuse to accept orders for extended deliveries. Prices are firm, premiums being paid for some classes of rolled products for prompt shipment. While some scattered sales of foundry and forge iron are reported, the other grades have been inactive. Little buying of importance is anticipated in the near future, as consumers have, for the most part, fully covered for their near future requirements.

**Pig Iron.**—The only transactions of importance have been in low grade foundry irons. Cast iron pipe foundries have bought moderate lots for early delivery and are still in the market for further quantities. Sales of some 5000 tons are reported by one selling interest at prices about equal to those quoted for forge iron. One cargo of 5000 tons of Middlesbrough iron, bought several months ago, for the account of one of the Delaware River cast iron pipe works, is now unloading at this port. Sales of the higher grades of foundry iron have been light. The larger buyers are covered for near future requirements and transactions have been mainly in miscellaneous lots, ranging from carloads to a few hundred tons, for early shipment. Prices are more firmly maintained. For first quarter shipment \$19, delivered, represents the market for No. 2 X foundry. Inquiry is somewhat better and there has been some testing of the market for more extended delivery, as far ahead as the third quarter, but sellers are not particularly anxious to consider such business, as they are confronted with higher costs of production, and, as they are pretty well sold up for the early months of the year and have practically no stocks of iron on furnace banks, prefer to wait further developments. Under the circumstances the tendency to make slight concessions, which prevailed several weeks ago, is less apparent. Virginia foundry grades have been comparatively quiet, but prices are unchanged, at \$16, at furnace, for No. 2 X. A moderate movement in forge iron is noted. A sale of 1000

tons to a rolling mill in this district at \$17.25, at furnace, is announced, while other smaller transactions, at prices ranging from \$17.75 to \$18, delivered, are reported. On practically all of these sales shipment begins at once. No transactions have been reported in basic iron; at least one buyer is in the market for second quarter delivery, but sellers refuse to meet his idea of prices, holding firmly at \$18.75, delivered. There is still some demand for low phosphorus pig, the bulk of which has, however, been before the trade for several weeks. No sales beyond those recently announced have been reported. No heavy purchases of any grade of pig iron are anticipated in the immediate future. Inquiries with a view of testing the market will, no doubt, come out, but the customary dullness is expected during the first few weeks of the new year. Prices are practically unchanged, ranging about as follows for standard brands, delivered in buyers' yards, eastern Pennsylvania and nearby points:

Eastern Pennsylvania, No. 2 X foundry.....	\$19.00
Eastern Pennsylvania, No. 2 plain.....	\$18.50 to 18.75
Virginia, No. 2 X foundry.....	19.00 to 19.25
Virginia, No. 2 plain.....	18.50 to 18.75
Gray forge.....	17.75 to 18.00
Basic.....	18.75
Low phosphorus.....	22.75 to 23.25

**Ferromanganese.**—There has been no fresh demand in this territory, and prices are quoted nominally at \$45 to \$45.50, Baltimore, for 80 per cent. ferro, delivery during the first half of next year.

**Billets.**—The usual holiday and year-end quietness has been experienced. Mills in this territory are well supplied with orders and show no anxiety to get business, particularly for extended delivery. For moderate lots of ordinary rolling billets, delivered in this territory, \$30.60 is named, with forging billets ranging from \$2 to \$4 higher, depending on tonnage and specification.

**Plates.**—Specifications prior to the year-end were very heavy, and cancellations on unspecified portions of contracts were exceedingly small. In some instances specifications exceeded contract tonnages, which mills generally refused to accept. With consumers' requirements for the near future well covered, the volume of business in the next few weeks will probably be small. Prices are firmly maintained at 1.75c. to 1.80c. for ordinary plates delivered in this territory.

**Structural Material.**—While the demand has been rather light, as far as new business is concerned, large specifications on unexpired contracts have come out. The outlook for business for the current year is good. Plans for several large apartment houses have been completed. The estate of Henry C. Lea proposes to erect a 10-story steel and concrete manufacturing building. A project to build a 20-story hotel is announced. Mills are fully engaged, and deliveries on certain classes of material are still delayed. Prices are unchanged, plain shapes being quoted at 1.75c. to 1.80c., for delivery in this territory, dependent on specifications.

**Sheets.**—A large number of the mills which have been closed for repairs and inventories during the holidays resumed operations on Monday. Order books are in very good shape and the constant demand for sheets indicates a sharp increase in consumption. Prompt sheets command a premium, but for delivery during the first quarter the following range of prices is quoted: Nos. 18 to 20, 2.70c.; Nos. 22 to 24, 2.80c.; Nos. 25 and 26, 2.90c.; No. 27, 3c.; No. 28, 3.10c.

**Bars.**—Specifications on low priced contracts expiring with the close of the year were quite heavy. The market has a somewhat stronger appearance, although prices are practically unchanged, ranging from 1.65c. to 1.75c., delivered, for refined iron bars for near future shipment. Steel bars are firm at 1.65c. to 1.70c., delivered, but prompt shipment cannot be had from the leading producers except on special sizes.

**Coke.**—There has been some delay in deliveries, due to the inability of transportation interests to get their roads in shape after the blizzard, and some consumers have been inconvenienced by a short supply. Inquiries have been large for first half shipments, particularly in foundry coke, for which buyers are not generally willing to contract at present prices. The market, on the whole, is practically unchanged, prices for standard brands being well maintained. For delivery in this territory during the early portion of the year the following range of quotations per net ton is named:

Connellsville furnace coke.....	\$4.75 to \$5.00
Foundry coke.....	5.25 to 5.50
Mountain furnace coke.....	4.35 to 4.60
Foundry coke.....	4.85 to 5.10

**Old Material.**—Transactions have been extremely light in all grades. Steel mills are well supplied, embargoes being in force at nearly all of the associated mills, while the outside mills are, generally, well stocked for near future requirements. Rolling mills also have a pretty good quantity of old material on hand and show little interest in the market, except when lots are to be had at bargain prices. In a number of cases traffic conditions, owing to the recent

storm, have been such that a number of mills have ordered shipments withheld until conditions improved. The market therefore has been practically at a standstill, not enough business being transacted in most grades to establish a market. The following range of prices is nominally quoted for delivery in buyers' yards, eastern Pennsylvania and nearby points:

No. 1 steel scrap and crops.....	\$17.00 to \$17.50
Old steel rails, rerolling.....	18.00 to 18.50
Low phosphorus.....	23.00 to 23.50
Old steel axles.....	23.00 to 24.00
Old iron axles.....	28.00 to 29.00
Old iron rails.....	20.50 to 21.50
Old car wheels.....	17.50 to 18.00
No. 1 railroad wrought.....	19.50 to 20.00
Wrought iron pipe.....	16.50 to 17.00
No. 1 forge fire.....	16.00 to 16.50
No. 2 light iron.....	10.25 to 10.75
Wrought turnings.....	14.25 to 14.75
Cast borings.....	12.00 to 12.50
Machinery cast.....	17.00 to 17.50
Railroad malleable.....	16.50 to 17.00
Grate bars.....	14.50 to 15.00
Stove plate.....	18.25 to 18.75

Herbert H. Ives, formerly in charge of the branch office of Henry A. Hitner's Sons Company, in the Pennsylvania Building, Philadelphia, has severed his connection with that concern and is now associated with the Charles Dreifus Company, iron and steel, with offices in the same building.

## San Francisco.

SAN FRANCISCO, December 29, 1909.

The Pacific Coast market on iron and steel products is of a holiday character. The tonnage ordered during the month has been the lightest since last spring. Fabricating orders for structural material have been coming out in fairly good shape, several contracts of some importance having been placed within the last three weeks, but no business of any consequence is being transacted in other departments. In view of advancing prices, specifications of both consumers and merchants have been extremely heavy during the past three months, purchases being somewhat in excess of the immediate needs of the market, and with heavy arrivals the shortage of stock is less keenly felt. Supplies, however, are by no means excessive in any line of finished material, and all indications favor a renewal of the buying movement by the middle of January. The prospective demand in consuming industries for sheets, bars, merchant steel and pipe is extremely heavy, local interests making larger estimates of their requirements for the coming year than ever before. Machinery is dull at the moment, but the mining and saw-mill industries are in a favorable condition, while the establishment of several large railroad and car shops indicates a larger movement of machine tools.

**Rails.**—Rail orders are of little consequence at the moment, the larger requirements for the coming year having been covered by contracts booked in the last few months. As small track-laying operations are prevented by weather conditions, there is no immediate demand for light rails, though there is considerable inquiry for spring delivery. Several new railroad projects are being talked of, and rail interests expect a heavier tonnage from the smaller enterprises than they have had this year. Arrangements are being made for the extension of the Tonopah & Goldfield Railroad from Tonopah, Nev., to Bodie, Cal., and for broad-gauging the lumber roads around Bodie, involving the laying of 60 miles of new track. The Southern Pacific is planning to replace its rails over Tehachapi Pass with 90-lb. steel. The Hood River Railroad Company, Hood River, Ore., is planning a seven-mile extension. The receiver and bondholders of the Ocean Shore Railroad are working on a plan to carry the line to completion.

**Bars.**—Specifications on existing contracts have been very light since the middle of the month, the year's business having been practically brought to a close prior to that time. Transactions are almost entirely of a small jobbing nature, and current business is making no great reduction in local stocks, owing to the usual year-end dullness in all lines. In view of the inquiries which have been received of late, bookings between now and the middle of January will probably be heavy. Material now arriving on jobbers' orders will probably be ample for their requirements of the first quarter, but there is a general disposition to provide as soon as possible for more distant needs, owing to the difficulty experienced in getting prompt deliveries. Prices are firmly maintained by local interests, though no change has been made in quotations. Bars from store, San Francisco, are quoted as follows: Steel, 2.50c.; iron, 2.30c.

**Structural Material.**—Holiday conditions appear to have had little effect on the situation in structural material, fabricating orders showing little decrease from the previous month. While only a few of the contracts let recently amount to 500 tons or over, there is enough new work of a smaller nature to keep most of the local shops occupied for several months of the new year. Local contractors are

accordingly taking a firmer attitude in regard to prices. Eastern fabricators, while not inclined to take up much of the small work here, are increasing their activity in this market, all large jobs let recently except the Prager building, let to the Ralston Iron Works, having been taken by Eastern interests. The steel for the municipal pumping station at Second and Townsend streets will be fabricated by the McClintic-Marshall Construction Company. A 10-story building for the Peoples' Savings Bank at Sacramento will be erected by the Thompson-Starrett Company, and the steel contract will probably go to Milliken Bros. The increasing tonnage for other coast cities than San Francisco is indicated by the building record of Sacramento for the past year, the valuation of permits having been \$2,044,744, compared with \$1,402,774 for 1908, the largest previous year. The outlook is especially good at Portland, Ore., where large buildings are badly needed. The Yeon building contract has not yet been placed. T. B. Wilcox announces that he will erect a 12-story office building in Portland, and the Marshall-Wells Hardware Company of Portland plans to erect warehouse buildings of three and six stories, covering two city blocks. The Smith-Rice Company has taken a contract for repairing and renewing the steel in the Rialto building, San Francisco, and the Ralston Iron Works has a contract for a 5-story apartment house on McAllister street. M. Fleishhacker is preparing to erect a 7-story hotel building. A project is now being financed for a large hotel at Fresno, Cal. Prices on plain material are firm, but not quatably higher, beams and channels, 3 to 15 in., from store in San Francisco, being quoted at 2.70c.

**Pig Iron.**—Local foundrymen have been rather disappointed at the volume of business for the second half, which was expected to be at least normal. While orders have required a heavier tonnage than for the previous year, the foundries have not been fully occupied for any length of time, and are now working on a moderate scale. While the outlook is somewhat better, but little new business has come out for the last two weeks. Pig iron accordingly remains in the sluggish condition which has prevailed for some time. The tonnage now held by melters or under contract will probably be sufficient to cover the principal requirements of the first quarter, though some activity is expected in a small way. While several small lots have recently arrived from China and the Continent, the imports for several months have been light, and conditions are very unfavorable to heavy importation. Quotations are little more than nominal, especially on domestic iron, scarcely any of which is moving here. The smelter of the Noble Electric Steel Company at Heroult, Cal., resumed operations December 21, and is expected to continue for some time, with an output of about 16 tons of pig iron daily. Prices on spot foundry iron are quoted as follows: Chinese, \$25; English and Continental, \$23 to \$24.50; and Southern, \$25.

**Cast Iron Pipe.**—Some fair orders are expected early next month. The town of Colusa, Cal., has rejected bids on other material for a new water system, and will receive proposals for about 700 tons of cast iron pipe January 3. The new high-pressure system in Oakland is about complete, and has satisfied all requirements, being tested under 350 lb. pressure. Present conditions indicate a rather quiet market through most of the first quarter.

**Merchant Pipe.**—Local jobbing trade is rather light, though of much larger proportions than a year ago. Merchants are still holding back their orders for shipment from the mills, and no general resumption of activity is expected before the middle of January. Some inquiry from the oil interests is noted; but owing to the difficulty of making deliveries in that territory at present, little business is likely to develop during the first quarter.

**Old Material.**—There is little alteration to report in this market, most descriptions being very dull and firmly held in anticipation of an increasing demand. Relaying rails have been moving freely, keeping the market well cleaned up. Cast scrap is moving only in small quantities, as the stronger holders are asking higher prices than meltters are willing to pay. Steel melting scrap is firm, but there is still considerable on the market, and another cargo is shortly to be shipped East. Little railroad wrought scrap is being offered. Quotations based on recent transactions are as follows: Cast scrap, \$17 and steel melting scrap, \$11, per gross ton; railroad wrought scrap, \$12.50 to \$13.50, and rerolling rails, \$12, per net ton.

The first through train on the Western Pacific Railroad has just arrived at the western terminal with 26 cars of wire and nails for the American Steel & Wire Company.

The D'Olier Engineering Company's suit to prevent payments by the City Treasurer to the Byron Jackson Iron Works on its \$62,000 contract for machinery for the auxiliary water system has been lost.

The lowest bid for machinery for the new municipal pumping station, opened December 22, was that of C. C. Moore & Co., of \$190,000.

Richmond Dean, general manager of the Pullman Company, has closed a deal for 21 acres at Point Richmond, on

San Francisco Bay, to be used for repair shops. Construction is to be started next March. The plant will include a 40-stall car shop, upholstering, painting, truck repair and machine shops, and will cost about \$500,000.

C. H. Schlacks, vice-president of the Western Pacific, states that the first work of the superintendent of motive power will be to take up the construction of the company's main shops at Sacramento, Cal.

The Tonopah & Goldfield Railroad Company is preparing to rebuild its shops at Goldfield, Nev., at a cost of about \$100,000.

The Waterhouse & Lester Company, having branches in various cities in California, has added supplies for the automobile trade to its lines of vehicle materials.

The Western Steel Corporation has purchased the Moran Shipbuilding Company's works at Seattle, Wash.

The Swarts & Cooper Iron & Metal Company has been incorporated in San Francisco, with a capital stock of \$10,000, by Marks Swarts, Paul Cooper and G. C. Halsey.

## St. Louis.

ST. LOUIS, January 3, 1910.

The fact that more than \$1,000,000,000 is the value of the commerce of this city for the year 1909, according to the best estimates of manufacturers and jobbers, reflects a very satisfactory degree of activity, and furthermore augers well for the business of the new year. General trade indicates an increase of approximately 12 per cent. over 1908. The transactions of the banks for 1909 will aggregate about \$3,440,000,000, surpassing all previous records. The people of Missouri have on deposit in the banks of this State a total of \$429,962,000, as shown by recent official statistics. The city of St. Louis has grown more in the year that has closed than in any previous year of its century of existence; consequently, to surpass this record for 1910 will require very strenuous efforts on the part of its business men.

**Coke.**—A candid report of this market for the past week requires the statement that it would appear that no one was buying unless obliged to do so. The same explanation which has been made with regard to this really normal quietness still obtains, though even more pronounced because of the last week in the closing month of the year. There has been some carload business doing, and specifications on contracts have required attention. Prices show some irregularity, \$3 being named by some houses, while others quote \$3.25 for spot 72-hour standard Connellsville. For shipment over the first half of 1910, the market appears to be firm at \$3.35—at least no one is naming lower figures for this grade—per net ton, f.o.b. oven.

**Pig Iron.**—Some of the leading brokers availed themselves of the opportunity of a few days' vacation while their office force was principally engaged in winding up the books for the year. So far as could be learned the only inquiry of importance pending during the week is for 500 to 600 tons of 50 per cent. ferrosilicon for delivery over the entire year. Another house reports inquiries aggregating 1500 tons of No. 2 Southern foundry for shipment over the first half. It is believed that the larger buyers are pretty well stocked, owing to the disposition on a rising market to buy fully up to if not beyond requirements for a reasonable period. It is also thought that furnacemen have pretty generally insisted on specifications according to contract on pain of cancellations in response to solicitations for extensions in time of shipment. Such requests have been received from certain foundrymen for whose products the demand fell off toward the close of the year, owing, in part, to some considerable suspension of building and other out-of-door work which the weather hindered. In consequence of the slackening off in the demand for Southern foundry, the price for No. 2 is reduced to \$14.50, f.o.b. Birmingham, for shipment over the first half, with stray sales for prompt shipment at \$14, though it is not likely that large lots can be secured at that figure. The lower grades are scarcer and relatively firmer.

**Lead, Spelter, Etc.**—Lead is quiet, though bids of 4.60c. for Missouri were refused. Spelter is quotable at 6.10c. to 6.12½c., East St. Louis; market dull.

**Old Material.**—The only factor affording strength to the market in the absence of railroad offerings for the week, though it is expected some lists will be published early in the year, and the scarcity, with corresponding strength in prices for low grade pig iron. There is, however, a confident feeling prevalent that with the full resumption of business in January, the demand will gradually gather in volume. While we continue our quotations unchanged, it should be noted that, in absence of business, these figures are more or less nominal. We quote dealers' prices as follows, per gross ton, f.o.b. St. Louis:

Old iron rails.....	\$16.50 to \$17.00
Old steel rails, rerolling.....	15.50 to 16.00
Old steel rails, less than 3 ft.....	14.50 to 15.00
Relaying rails, standard sections, subject to inspection.....	25.00 to 25.50
Old car wheels.....	17.50 to 18.00
Heavy melting steel scrap.....	14.50 to 15.00
Frogs, switches and guards, cut apart..	14.50 to 15.00

The following quotations are per net ton:

Iron fish plates.....	\$14.00 to \$14.50
Iron car axles.....	20.50 to 21.00
Steel car axles.....	19.50 to 20.00
No. 1 railroad wrought.....	15.00 to 15.50
No. 2 railroad wrought.....	14.00 to 14.50
Railway springs.....	13.00 to 13.50
Locomotive tires, smooth.....	15.50 to 16.00
No. 1 dealers' forge.....	10.50 to 11.00
Mixed borings.....	8.00 to 8.50
No. 1 busheling.....	12.00 to 12.50
No. 1 boilers, cut to sheets and rings.....	11.00 to 11.50
No. 1 cast scrap.....	13.50 to 14.00
Stove plate and light cast scrap.....	10.00 to 10.50
Railroad malleable.....	11.00 to 11.50
Agricultural malleable.....	9.50 to 10.00
Pipes and flues.....	10.50 to 11.00
Railroad sheet and tank scrap.....	9.50 to 10.00
Railroad grate bars.....	10.50 to 11.00
Machine shop turnings.....	10.50 to 11.00

Ice floes tore down the false work of the middle span of the new McKinley Bridge at this city on the 31st ult., causing a loss of over \$200,000. Three hoisting engines, a derrick, a traveler and a barge, with pile driver on it, were carried away.

The Terminal Association has added \$150,000 worth of ground to its holdings along the river in North St. Louis, with a view to future development.

Preliminary work on the \$6,500,000 levee project at East St. Louis is well under way.

The Laclede Gaslight Company will erect a new retort building at Second and Rutgers streets, to be about 325 ft. in length, 60 ft. in width and cost about \$325,000.

The Scullin-Gallagher Iron & Steel Company has purchased 1 1/4 acres of land lying along the Missouri-Pacific Railroad tracks adjoining its plant.

The machinery department of the Chicago & Alton Railroad shops at Bloomington, Ill., recently commenced working 13 hours, indefinitely, in the effort to turn out more locomotives to break the freight blockade.

The Pope-Hartford Motor Car Company of Kansas City has been incorporated; capital stock, \$50,000; incorporators, A. J. Davis, M. H. Davis and Frank H. Braden.

A certificate of increase of capital stock has been filed by the Scott-Madden Iron Works Company, St. Louis, from \$75,000 to \$150,000.

### The German Iron Market.

BERLIN, December 23, 1909.

Notwithstanding the quieter tone of the market, which most of the reports speak of as prevailing as the holiday season approaches, the upward tendency of prices holds on. Last Friday's trading on the Düsseldorf Exchange again brought advances in several lines of goods. Bars of soft steel were quoted at 104 to 110 marks, against 104 to 108 on December 3, and the thinner qualities of plates at 127.50 to 135 marks, against 127.50 to 131. Several days ago the Association of Rhenish-Westphalian rolling mills operating on bands and strips voted an increase of 5 marks a ton in that class of products, to take effect at once; and it also declared the second quarter of 1910 open for taking contracts. Two days ago the combination of bar dealers of the Rhine Province and Westphalia decided to add 10 marks a ton to the price of bars, plates, bands and strips. From the Silesian District it is reported that a considerable advance in the price of thin sheets is looked for.

The upward tendency of prices in Belgium continues. The advance of semi-manufactured steel mentioned in last week's letter has now caused a strong demand for pig iron, and the furnaces have just been able to raise Thomas and other steel-making grades by two francs a ton. The latest news from Charleroi indicates that an advance in foundry iron is also expected soon.

Various developments are going on in connection with trade organizations, either existing or projected. The committee working out a plan for a wire nail combination succeeded last week in removing the last obstacles to its organization, and a meeting is to be held early in January for the purpose of completing it. The previously reported movement to organize the fine plate trade—3 millimeters is the maximum thickness embraced in the movement—is understood to be making satisfactory progress; the excellent prospects for the formation of an organization are the cause of the advance in prices reported above.

The furnacemen are still pegging away at the problem of getting together. Some 10 days ago those of the Rhenish-Westphalian District held a conference, but the result was decidedly negative in view of the refusal of the Kraftwerk near Stettin to join the proposed combination. This company operates several blast furnaces with great success, having the advantage of easy water communication for Swedish ores and English coal and coke; and it dominates the market of all northeastern Germany. A yesterday's dispatch from Cologne, however, states that the Kraft people are at last willing to cast in their lot with a new organization of the pig iron trade, and that the negotiations will again be taken up.

A recent meeting of the manufacturers of plates and other forms of steel used in the shipbuilding industry recently held a conference to discuss the prolongation of their selling agency now maintained at Essen. The meeting had been preceded by efforts to induce several works now independent to join; but one at least of these demanded such big allotments that no understanding was reached.

To-day the ore producers of the Siegerland District are holding a meeting to begin negotiations for the renewal of their selling agency arrangement, which expires at the end of June. Grave difficulties stand in the way of the renewal. The mines not connected with furnaces or steel works had to bear the brunt of the restriction of production during the recent period of depression; and these concerns are reported as not being willing to continue in the combination under the existing arrangement of allotments. Incidentally it is mentioned that the mines in that part of the country, which recently raised their production to 70 per cent. of their capacity, are now in a position to make a further increase; such action is looked for to-day.

Germany's exports of iron and steel products in November reached an unusual level. They amounted to 397,628 metric tons, comparing with a monthly average of about 322,000 tons for the previous 10 months. Imports amounted to only 41,800 tons. The exports were about 108,800 tons greater than in November, 1908; and the excess of exports over imports rose to 355,825 tons, as against 244,556 tons in November, 1908.

### Cincinnati.

CINCINNATI, OHIO, January 5, 1910.—(By Telegraph.)

The New Year's entree in this market has been made under distinctly encouraging conditions. The crude markets all show a stronger tone. Inquiries are increasing, although many of these are denominated feelers. General machinery and particularly machine tool manufacturers are reporting a considerable increase in inquiry and are negotiating some good sized sales. The Cincinnati Milling Machine Company on Monday and Tuesday placed additional orders for turret lathe equipment and for additional automatic machines, which, with orders placed a few weeks ago and during the last months of 1909, make up one of the largest lists negotiated for machine shop installation at this time. The Ohio Motor Car Company, Carthage, is also buying and is installing cylinder grinders, air compressors, heavy duty vertical mills and boring and reaming machine and will enlarge its plant immediately.

**Pig Iron.**—The market is more settled, and there is an accumulation of inquiries for a great variety of irons. The leading pipe interest is seeking low grades for delivery to its Burlington plant, and an Ohio pipe maker is negotiating for 3000 to 4000 tons per month for delivery to its two plants. Foundry iron seems to be the leader. The price of \$14, Birmingham, for No. 2 foundry seems to be available for several standard brands for delivery through the first half, although the larger Southern interests are holding for \$14.50, restricting the \$14 price to first quarter. The local melter who wanted Northern and Southern in equal tonnages for furnace making settled temporarily on 1800 tons of Alabama iron for delivery through the first half, which he will mix with some Northern due on contract. The price paid was about \$14, Birmingham, for No. 2. A northern Ohio fence maker wants about 2000 tons of Northern for second and third quarter delivery; a Kentucky foundry company asks for 400 tons each Northern and Southern analysis iron, for delivery in first half. An Indianapolis engine manufacturer would buy some iron, and there are also some small lots of malleable wanted in central territory. Forge is strong at \$13.50 for first half and is reported scarce. Agricultural implement manufacturers are beginning to feel the markets for the year's supply, the first actual inquiry for the year being that of an engine maker in northern Ohio who asks for 250 to 300 tons each of Northern and Southern for first half. The New Year price for high silicones is based on \$19.50, at furnace, for 8 per cent. for first quarter. For immediate delivery and through first quarter, based on freight rates of \$3.25 from Birmingham and \$1.20 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 foundry.....	\$17.75 to \$18.25
Southern coke, No. 2 foundry.....	17.25 to 17.75
Southern coke, No. 3 foundry.....	16.75 to 17.25
Southern coke, No. 4 foundry.....	16.50 to 16.75
Southern coke, No. 1 soft.....	17.75 to 18.25
Southern coke, No. 2 soft.....	17.25 to 17.75
Southern gray forge.....	16.50 to 16.75
Southern mottled.....	16.50
Ohio silvery, 8 per cent. silicon.....	20.70
Lake Superior coke, No. 1.....	18.70
Lake Superior coke, No. 2.....	18.20
Lake Superior coke, No. 3.....	17.70
Standard Southern car wheel.....	24.75 to 25.25
Lake Superior car wheel.....	21.75 to 22.25

(By Mail.)

**Coke.**—Unfavorable weather conditions have restricted both production and shipping. Standard brands of Wise County foundry are quotable at \$3.25 per net ton, at oven,

although there is some \$3 coke on the market. Pocahontas and New River foundry brands are selling at \$2.90 to \$3 for the next few months. A large Tennessee furnace interest is out for 5000 tons furnace coke for delivery over the next three or four months. The quoted prices of Wise County furnace grades are \$2 to \$2.25, although \$1.90 is reported as having been done on a round tonnage. No change is reported in Connellsville quotations, and furnace grades are obtainable at \$2.75 to \$3 per net ton, at oven, for delivery over the first half.

**Finished Iron and Steel.**—At the sales agencies there is a feeling of satisfaction over having cleaned up with the year's close practically all the material sold at the panic prices of early 1909, and the general opinion is, that the future looks decidedly good. The most encouraging feature of January's opening was the heavy volume of specifications against first quarter and half contracts. It looks as though the shrewd buyer was specifying up to his limit which would signify that he is anticipating a general rise in finished materials some time in the first quarter. There is no change in prices. Steel bars are still quotable here at 1.60c., dealers getting 1.90c. from stock. The turn of the year finds considerable of the cheap bar business off the books. Iron bars are quoted at 1.55c., Pittsburgh, and the best that can be done on standard sizes is 1.65c., Cincinnati. A few mills whose output is restricted in sizes occasionally move some of their product at 1.55c., Cincinnati, or thereabout. The opening of the year brought to sheetmakers in this neighborhood a fine grist of inquiries, and some good business. Heavy specifications on contract are the feature of the year's beginning.

**Old Material.**—The market is stagnant. The railroads are offering nothing, but all local interests are buying freely from miscellaneous sources, and are preparing for one of the best years in the history of the business. There are rumors here of some buying for the Gary mills. Few inquiries are in hand for any line of scrap, but it is too soon after the holidays to gauge conditions; it is the opinion of conservative dealers that a strong buying movement is to be expected in the course of four to five weeks. In the absence of sufficient business to establish quotations, the prices ruling immediately prior to the holidays are herewith given, and are f.o.b. Cincinnati and southern Ohio:

No. 1 R. R. wrought, net ton.....	\$15.00 to \$15.50
Cast borings, net ton.....	8.00 to 8.50
Heavy melting steel scrap, gross ton...	15.00 to 15.50
Steel turnings, net ton.....	9.50 to 10.00
No. 1 cast scrap, net ton.....	13.00 to 13.50
Burnt scrap, net ton.....	10.00 to 10.50
Old iron axles, net ton.....	18.50 to 19.00
Old iron rails, gross ton.....	18.00 to 18.50
Old steel rails, short, gross ton.....	15.00 to 15.50
Old steel rails, long, gross ton.....	16.00 to 16.50
Relaying rails, 56 lb. and up, gross ton...	22.50 to 23.00
Old car wheels, gross ton.....	15.00 to 15.50
Low phosphorus scrap, gross ton.....	17.50 to 18.00

Ashland Furnace, making high silicon pig iron, is out for relining, expecting to go in early in February.

La Follette Furnace expects to go in blast on or before February 1.

Chocolay Furnace, at Marquette, Mich., practically rebuilt, will blow in January 5 and will make Lake Superior charcoal, foundry, malleable and car wheel grades; operated by the Lake Superior Iron & Chemical Company; capacity, 2000 tons per month; sole agents, Rogers, Brown & Co.

### Cleveland.

CLEVELAND, OHIO, January 4, 1910.

**Iron Ore.**—Following the establishment of the price of non-Bessemer ore at an advance of 50 cents a ton early last week an active buying of that grade set in and contracts have been placed for large tonnages. Furnacemen generally seem ready to buy and indications point to the sale of the bulk of the tonnage during the next two or three weeks. Many consumers are contracting for more ore than they did a year ago. The condition of the market is radically different from that at the time buying set in last season. The buying movement then did not start until well along in the spring, and furnacemen bought very conservatively, many contracting for less than their usual tonnage and taking on more later in the season when business conditions improved. One important ore interest that has always acted independently in fixing prices is selling Bessemer ore at the 50-cent advance, but announces that it has not yet decided on its price for non-Bessemer. Another interest that sold its output slightly below the market a year ago announces that it will hold to regular prices. There is still some inquiry for Bessemer ore, but nearly all the available tonnage was reserved several weeks ago. We quote prices as follows: Old Range Bessemer, \$5; Mesaba Bessemer, \$4.75; Old Range non-Bessemer, \$4.20; Mesaba non-Bessemer, \$4.

**Pig Iron.**—The market has been exceedingly quiet. The increased volume of inquiries for foundry iron the previous

week or two indicated a little more activity, but these inquiries seem to have resulted in sales only in a few cases. They were regarded at the time as mostly feelers. Not much improvement is expected until the latter part of the month, when inventories are over. The melt continues heavy, many foundries being run at their maximum capacity. Practically all the iron bought for delivery in the last quarter of 1909 has been delivered, and in a number of cases first quarter shipments were anticipated in the latter part of December. Prices remain practically stationary. Local furnaces quote No. 2 foundry at \$18, delivered, Cleveland, for the first quarter, and \$17.50, at furnace for outside shipment. In the Valley, \$17 at furnace appears to be the minimum price for No. 2, but some interests that have considerable tonnage on their books continue to adhere to \$17.50, believing that the market will stiffen up as soon as a buying movement sets in. The advance in the price of non-Bessemer ore has as yet had no apparent effect on pig iron prices, but furnacemen are talking of an advance of \$1 a ton for the last half to make up for the increased cost of their raw material. For prompt delivery and first quarter we quote, delivered, Cleveland, as follows:

Bessemer .....	\$19.90
Northern foundry, No. 1.....	\$18.40 to 18.65
Northern foundry, No. 2.....	17.90 to 18.00
Northern foundry, No. 3.....	17.40 to 17.65
Gray forge.....	17.25 to 17.40
Southern foundry, No. 2.....	18.35
Jackson County silvery, 8 per cent. silicon.....	21.55

**Coke.**—The cold weather and scarcity of water have restricted production and delayed shipments on contracts. As a result there has been more demand for spot coke. The market, however, remains generally quiet. Consumers are nearly all under contract for the first half. We quote standard Connellsville furnace coke at \$2.60 to \$2.70 per net ton, at oven, for spot shipment, and \$2.70 to \$2.80 for the first half. Connellsville 72-hr. foundry coke is held at \$3.15 to \$3.25 for spot shipment and \$3.25 to \$3.50 for first half.

**Old Material.**—The market continues quiet. Prices remain about stationary, but quotations are largely nominal, scarcely enough business coming out to establish prices. The only buying by the mills is of small lots to fill in. No inquiries have come out for round lots for future delivery, and as mills seem to be pretty well supplied for the present the market is not expected to become very active this month, although an improvement in the demand is looked for as soon as inventories are over. The Erie Railroad will close January 5 and the Pennsylvania Lines, West, January 6 on lists containing about their usual tonnage. Prices per gross ton, f.o.b. Cleveland, are as follows:

Old steel rails.....	\$16.25 to \$16.75
Old iron rails.....	20.00 to 20.50
Steel car axles.....	20.50 to 21.00
Old car wheels.....	17.00 to 17.50
Heavy melting steel.....	15.75 to 16.25
Relaying rails, 50 lb. and over.....	22.50 to 23.50
Agricultural malleable.....	14.50 to 15.00
Railroad malleable.....	16.50 to 17.00
Light bundled sheet scrap.....	11.00 to 11.50

The following prices are per net ton, f.o.b. Cleveland:

Iron car axles.....	\$21.00 to \$21.50
Cast borings.....	8.75 to 9.00
Iron and steel turnings and drillings.....	10.50 to 10.75
Steel axle turnings.....	12.00 to 12.50
No. 1 busheling.....	14.00 to 14.50
No. 1 railroad wrought.....	16.50 to 17.00
No. 1 cast.....	14.25 to 14.75
Stove plate.....	12.00 to 12.50
Bundled tin scrap.....	11.00 to 11.50

**Finished Iron and Steel.**—A fair volume of specifications was received by mill agencies in the last few days of the year on low priced contracts that expired January 1. Many of these orders were for odds and ends, the bulk of the tonnage on contracts having previously been ordered. There are few consumers who did not specify for every ton on their contracts, so that cancellations have been small. About the only exceptions to full specifications were in cases where the consumers had no use for the material because they had been unable to secure deliveries as desired. Heavy specifications, mostly for steel bars, have come from jobbers for first quarter delivery. The leading interest has advanced its minimum price for steel bars to 1.50c., Pittsburgh, and that is now the minimum quotation in this market for future delivery. Some bar contracts for the first quarter are now being taken, on which deliveries will not be made until the second quarter. There is a fair volume of inquiry for contracts on steel bars, plates and structural material, but with the exception of the bar contracts noted the mill agencies are not disposed to make contracts at the present time. While not as active as a few weeks ago, there is some demand for carloads of plates and shapes for quick shipment. One interest is in a position to promise plate deliveries in 30 days. We quote plates at 1.60c., Pittsburgh, for delivery in 30 days or longer, but for quicker shipment premiums are being paid. The leading interest has taken an order for 500 tons of plates and shapes for repairs to lake boats. The demand for iron bars is holding up fairly well, and local mills, which are well filled up for January, have advanced their price \$1 a ton, to 1.65c. to 1.70c., Cleveland. No new

structural work has developed, but the outlook is exceedingly satisfactory, probably more work being in sight at the present time than at the beginning of any previous year. Some of this work is expected to come out the present month. The demand for forging billets in carloads for prompt shipment is quite active and orders are being taken for local delivery at \$32, Eastern mill, although there are reports that this price is being shaded. The demand for light rails continues fairly good. The demand for sheets is less active, but prices are firm. With the heavy volume of specifications in finished lines during December, mill agencies look for a considerable falling off in orders the present month.

## Buffalo.

BUFFALO, N. Y., January 4, 1910.

**Pig Iron.**—Quite a little buying is in progress, aggregating about 20,000 tons for the week, for first and second quarter deliveries, mostly foundry grades, with some business in malleable from eastern New York and New England foundries. Inquiries are also out for considerable last half tonnage in foundry, malleable, basic and some low silicon foundry. Shipments to go out from the furnaces for the month of January are very heavy, prices have an upward tendency and the indications are that schedules for this district will be advanced within a week or two. One interest is already quoting higher, having named \$17.50, Buffalo, on 600 tons of gray forge for first half delivery. We quote as follows per gross ton, f.o.b. Buffalo, first and second quarter deliveries:

No. 1 X foundry.....	\$17.50 to \$18.00
No. 2 X foundry.....	17.25 to 17.75
No. 2 plain.....	16.75 to 17.25
No. 3 foundry.....	16.50 to 16.75
Gray forge.....	16.25 to 16.50
Malleable.....	17.50 to 18.00
Bessemer.....	19.25 to 19.75
Basic.....	18.25 to 18.75
Charcoal.....	20.50 to 21.00

**Finished Iron and Steel.**—Some of the local selling agencies report that the large specifications against contracts for finished products expiring January 1, which were sent in during the closing days of December, have had a lightening effect on the volume of new business coming in this week; but the local representative of the leading interest states that orders and contracts of good size for bar mill products continue to come in daily. All the agencies state that with the exception of a very small percentage all of the 1909 contracts were fully specified before the terminating date and in consequence the amount of material canceled from these contracts was exceedingly limited. Business in structural lines continues active, and a number of new building projects recently decided upon will soon be ready for bids. It is expected that bids will be closed this week for the Franklin automobile factory at Syracuse, involving about 1000 tons of steel, and also for the Beaver Mfg. Company's new plant, Buffalo, 300 tons, and contract for the steel work for the Standard Mirror Company's factory, Buffalo, about 200 tons, has been awarded to the George Kellogg Structural Company, while the Jones & Laughlin Steel Company was awarded contract for the 250 tons of steel for the linseed oil mill which the Spencer Kellogg Company, Buffalo, is to build at Edgewater, N. J. Bids have been received for the Faxon, Williams & Faxon bakery building, Buffalo, 150 tons, and contract will be awarded within a few days. Preliminary plans are being prepared by the Grade Crossings Commission of Buffalo for the elimination of 12 surface crossings on the Erie Railroad Company's International Bridge Branch-street subways, with overhead railroad bridges—for which large tonnages of structural steel and concrete reinforcement will be required.

**Old Material.**—The market is practically at a standstill, with very limited and scattering buying, and embargoes placed on shipments on contracts in many instances until after inventories are completed. It is expected by dealers, however, that there will be a little more activity in the course of a week or 10 days. Prices are stationary and nominal. We quote as follows, per gross ton, f.o.b. Buffalo:

Heavy melting steel.....	\$16.50 to \$17.00
Low phosphorus steel.....	20.00 to 21.00
No. 1 railroad wrought.....	17.75 to 18.00
No. 1 railroad and machinery cast scrap.....	16.50 to 17.00
Old steel axles.....	20.50 to 21.00
Old iron axles.....	26.00 to 26.50
Old car wheels.....	17.50 to 18.00
Railroad malleable.....	17.00 to 17.50
Boller plate.....	14.50 to 15.00
Locomotive grate bars.....	13.00 to 13.50
Pipe.....	14.00 to 14.50
Wrought iron and soft steel turnings.....	11.00 to 11.50
Clean cast iron borings.....	9.00 to 9.50
No. 1 busheling scrap.....	14.00 to 14.50

The furnace of the Punxsutawney Iron & Steel Company, Punxsutawney, Pa., which has been out for relining, will be blown in in the latter part of January.

## New York.

NEW YORK, January 5, 1910.

**Pig Iron.**—Inquiries for foundry, forge and low phosphorus irons have been of fair proportions, with transactions in the last named attracting most attention. Several Pennsylvania buyers have been in the market and sales amounting to several thousand tons have been made, with further business pending. Pipe makers have bought upwards of 5000 tons of gray forge, off basic and other irons, and one pipe foundry inquiry for 3000 tons is pending. Some rolling mill inquiry for gray forge has appeared also. A New Jersey buyer, whose inquiry was before the trade for some time, closed for 2500 tons, delivery over the first nine months of the year, some low priced iron being included, including some Virginia high silicon. An agricultural implement works and a large machinery foundry are inquiring for iron, but sales of foundry grades have been comparatively small. We quote foundry iron, delivery in the New York District in the first quarter of the year, as follows: No. 1, \$19 to \$19.25; No. 2, \$18.50 to \$18.75; No. 2 plain, \$18.25 to \$18.50.

**Steel Rails.**—Eastern business is slow in taking shape and the probabilities are greater that some rail capacity in Eastern districts will be available for the rolling of billets.

**Ferroalloys.**—The demand for ferromanganese is light and \$45.50 is the price in New York. Ferrosilicon is in fair demand and is selling at around \$63.

**Finished Iron and Steel.**—The contract has finally been awarded to the Thompson-Starrett Company for the Municipal Building in New York City, and the steel (25,500 tons) will be fabricated by the Pennsylvania Steel Company, deliveries to begin in June. The same company has also secured the 2000 tons for car inspection barns for the Interborough Rapid Transit Company. The Springfield, Mass., municipal building (1500 tons), the Haywood Brothers & Wakefield loft building (3500 tons), New York City, and the St. Vincent Hospital (2300 to 2400 tons), Indianapolis, are still pending. The 8000 tons for the mill buildings at Gary, Ind., of the American Sheet & Tin Plate Company will be fabricated by the American Bridge Company. The Rector restaurant and hotel at Broadway and Forty-third street, New York City, will require 2000 tons; the Thompson-Starrett Company is the general contractor. Bids are being received for a new building for the Otis Elevator Company in Buffalo, which will take 500 tons. The only other fairly sizable building inquiry up in this city is for an apartment house at 145th street and Riverside Drive, which will call for 700 to 800 tons of structural material. A number of bridge inquiries are reported. The Baltimore & Ohio Railroad is said to require about 2000 tons for a number of small bridges. The Atlantic Coast Line has placed an order with the Virginia Bridge & Iron Company for 1100 tons of bridge material. The influence of the holidays has not quite spent itself in other lines and some are rather quiet. New orders from jobbers are not to be expected for two or three months, as they are nicely stocked up for at least that time as a consequence of completing their specifications on the last year's contracts. This applies particularly to plates in this market. Generally speaking, a good year is looked for throughout the finished iron and steel trade, and a continuance of conditions as they are now will be satisfactory to nearly everyone, except perhaps the consumers of steel bars. Deliveries are worse in this line than in any other, and have been for months. There are no changes in prices in sight. Plain structural material and plates are still quoted at 1.76c.; steel bars, 1.66c.; ordinary refined iron bars, 1.70c. to 1.75c., and test bars, 1.75c. to 1.80c., all in carload lots, New York.

**Cast Iron Pipe.**—The new year opens with decided activity. Numerous inquiries are in the market from private gas and water companies aggregating probably 50,000 tons. New England cities and towns are quite freely advertising lettings for spring delivery, but few of these run over 500 tons. New York City will open bids January 12 on several contracts which will require a total of about 5000 tons. Several city contracts formerly advertised but on which awards have been deferred because of complications are still pending, involving, in one instance, about 8000 tons of large sized water pipe and in another about 6300 tons of either steel riveted or cast iron pipe. Prices are very firm because of the improved demand, notwithstanding the easier situation in pig iron. Carload lots of 6 in. are quoted at \$25.50 to \$26 per net ton, tidewater, and on large lots recently placed \$24.50 to \$25 has been secured.

**Old Material.**—The steel scrap trade is at a standstill. All the eastern Pennsylvania steel works are either embargoed or are so well supplied that dealers have been notified to suspend shipments until further orders. One cause of the glutted condition of these works is the recent heavy arrival of steel scrap from abroad. This stoppage of shipments also affects borings and turnings which are taken to a considerable extent by the steel works. Practically no

buying is now being done by rolling mills, while foundries are also less in evidence as buyers. Prices are practically unchanged, as dealers are unable to purchase at any cheaper rate than has recently prevailed. A much better market is expected after the middle of the month, as the business of the country is in such excellent condition that consumption is on a very large scale. The following quotations, per gross ton, New York and vicinity, are unchanged from last week:

Rerolling rails.....	\$16.00 to \$16.50
Old girder and T rails for melting.....	15.00 to 15.50
Heavy melting steel scrap.....	15.00 to 15.50
Relaying rails.....	20.50 to 21.00
Standard hammered iron car axles.....	26.00 to 27.00
Old steel car axles.....	19.50 to 20.00
No. 1 railroad wrought.....	17.50 to 18.00
Wrought iron track scrap.....	15.00 to 15.50
No. 1 yard wrought, long.....	15.00 to 15.50
No. 1 yard wrought, short.....	14.50 to 15.00
Light iron.....	9.00 to 9.50
Cast borings.....	9.00 to 9.50
Wrought turnings.....	11.00 to 11.50
Wrought pipe.....	14.00 to 14.50
Old car wheels.....	15.50 to 16.00
No. 1 heavy cast, broken up.....	15.00 to 15.50
Stove plate.....	13.00 to 13.50
Locomotive grate bars.....	12.50 to 13.00
Malleable cast.....	16.50 to 17.00

## Metal Market.

NEW YORK, January 5, 1910.

### THE WEEK'S PRICES.

Cents per Pound.

Copper.	Lead.		Spelter.		Cents.
	Electro-	Tin.	New St.	New St.	
Dec. Lake.	lytic.	Tin.	York.	Louis.	13.00 to 13.25
30. . . . .	14.00	13.62½	33.82½	4.70 4.65	12.50 to 12.75
31. . . . .	14.00	13.62½	33.80	4.70 4.65	11.75 to 12.00
Jan.					9.25 to 9.50
3. . . . .	14.00	13.75	33.15	4.70 4.65	7.75 to 8.00
4. . . . .	14.00	13.75	{ 32.65 }	4.70 4.65	12.25 to 12.50
5. . . . .	14.00	13.75	{ 32.75 }	4.70 4.65	8.75 to 9.00
					10.25 to 10.50
					4.20 to 4.25
					3.90 to 3.95
					5.00 to 5.25

Electrolytic copper has advanced and the price of lake copper has stiffened. The tin market is very sensitive and the week witnessed a sudden decline both here and in London. The market, however, is again slowly advancing. Lead is firm and large deliveries are being made, while spelter has again weakened. Foreign tin plates have further advanced and antimony is becoming scarce.

**Copper.**—Although there has been but little buying of copper, the market has an upward trend. There are many rumors about the forthcoming statistics of the Producers' Association, all of which are optimistic, and the trade is looking for very favorable figures. The foreign copper statistics for December show an increase of 2000 tons of stocks abroad, but it is expected that the decrease here will more than offset that. Some people contend that the decrease will amount to 8,000,000 or 10,000,000 lb. It is learned from reliable sources that leading producers are curtailing their output. Lake copper is quoted at 14c., but for some brands 14.25c. is being asked. Electrolytic is selling at 13.75c., and there are reports of sales made by some leading interests at 13.87½c. The exports of copper continue good, and since the first of the month 1061 tons have been shipped abroad. In London to-day spot copper was sold for £61 11s. 3d. and futures for £62 10s. The sales amounted to 350 tons of spot and 1000 tons of futures. The market was strong.

**Pig Tin.**—The pig tin market in general was quiet during the week, although it was very sensitive. Prices fluctuated and but few sales were made until yesterday, when some fair sized transactions were noted. The market slumped after the publication of the monthly statistics, January 3, which showed an increase of 990 tons in the visible supply as against December, 1908, and the price fell from 33.80c. to 33.15c. The following day it went lower and sales were made at 32.65c. The London market which fell off quickly recovered and this morning the market there was £2 2s. 6d. higher than the day before. Figures compiled by C. Mayer of the New York Metal Exchange, show that deliveries into consumption during December were very good, amounting to 3200 tons. The total for 12 months shows an increase of 8100 tons compared with the same time last year. The combined deliveries of London and Holland for December were 48 tons larger than last year. For the 12 months the decrease in deliveries amounts to 493 tons, compared with the same time last year. Shipments from the Straits for December were 891 tons larger than for the same month of last year. For the 12 months of this year the decrease in shipments amounts to 1979 tons, compared with the same time last year.

**Tin Plates.**—There has been a further advance in the price of foreign tin plates and sales in this country are larger than they have been for some time. In London to-day the price for plates at Swansea was put at 12s. 9d., which is the second penny and a half raise in two weeks. It is said that foreign tin plates are becoming scarce. The

local market is unchanged, except that delayed deliveries are contributing to the troubles of the consumers in addition to delayed freights. The leading interest is quoting \$3.84 for 100 lb. I C coke plates. Independent mills are still asking substantial premiums.

**Lead.**—The deliveries of lead are very heavy, but it is said that most of this metal was bought previous to the recent advance in price. But few sales have been made in this market of late, but sellers claim that there is something of a shortage and they are holding their price very firm. The American Smelting & Refining Company is asking 4.70c. for the metal, while outside interests are demanding 4.75c. In St. Louis the independent sellers control the situation and they are getting 4.65c. The price there is somewhat firmer than it was this time last week.

**Spelter.**—Spelter has weakened and sales are reported in New York at 6.25c., although most sellers are asking 6.30c. The demand for spelter is particularly good, as brass manufacturers are asking for large lots of high-grade metal. It is thought that some resale lots have weakened the market temporarily. In St. Louis spelter is sold for 6.15c.

**Antimony.**—Antimony for future delivery is becoming scarce, but the spot prices remain unchanged. Hallett's is 8.25c. and Cookson's 8.50c. Outside brands can be had at around 8c.

**Old Metals.**—Following are dealers' selling prices, which are nominally unchanged, although the market is very firm:

	Cents.
Copper, heavy cut and crucible.....	13.00 to 13.25
Copper, heavy and wire.....	12.50 to 12.75
Copper, light and bottoms.....	11.75 to 12.00
Brass, heavy.....	9.25 to 9.50
Brass, light.....	7.75 to 8.00
Heavy machine composition.....	12.25 to 12.50
Clean brass turnings.....	8.75 to 9.00
Composition turnings.....	10.25 to 10.50
Lead, heavy.....	4.20 to 4.25
Lead, tea.....	3.90 to 3.95
Zinc scrap.....	5.00 to 5.25

## Iron and Industrial Stocks.

NEW YORK, January 5, 1910.

The stock market displayed considerable strength until Monday of this week, when prices gave way to some extent under the influence of reports from Washington of a forthcoming message by President Taft which would not be construed favorably by business interests. An exception to this was International Harvester common, which rose \$6½ in one day. The range of prices on active iron and industrial stocks from Thursday of last week to Tuesday of this week was as follows:

Allis-Chalm., com..	15 - 15½	Railway Spr., pref.....	106½
Allis-Chalm., pref.	54½ - 55	Republic, com.....	44½ - 46½
Beth. Steel, com..	33½ - 34½	Republic, pref.....	104 - 104½
Beth. Steel, pref.	66	Sloss, com.....	86½ - 87½
Can, com.....	13½ - 14½	Sloss, pref.....	117½
Can, pref.....	8½ - 8½	Pipe, com.....	32
Car Fdry, com..	71½ - 73	Pipe, pref.....	83½ - 84%
Steel Foundries ..	64½ - 65½	U. S. Steel, com..	87½ - 92
Colorado Fuel.....	48½ - 50½	U. S. Steel, pref.....	123½ - 125%
General Electric.....	158½ - 160	Westinghouse Elec. 81½ - 83	
Gr. N. ore cert.....	79½ - 81½	Va. I. C. & C. 74	
Int. Harv., com..	116½ - 123½	Am. Ship, com.....	78 - 78½
Int. Harv., pref..	127½ - 129	Chl. Pneu. Tool.....	39½ - 40½
Int. Pump, com..	52 - 52½	Cambr. Steel.....	48½ - 49½
Int. Pump, pref..	82½ - 90	Lake Sup. Corp.....	28 - 28½
Locomotive, com..	60½ - 62½	Warwick.....	11½ - 11½
Nat. En. & St. com.	27½ - 29	Crucible St., com.....	17 - 19½
Pressed Steel, com.	51 - 52½	Crucible St., pref.....	93 - 95
Pressed St., pref.	106 - 107	Harb.-W. Ref., com.....	34
Railway Spr., com.	50½ - 52		

Last transactions up to 1.30 p. m. to-day are reported at the following prices: United States Steel common 87½, preferred 123%, bonds 105; Car & Foundry common 71½, preferred 120; Locomotive common 60½, preferred 114½; Steel Foundries 65; Colorado Fuel 48½; Pressed Steel common 51, preferred 107½; Railway spring common 49; Republic common 44%, preferred 104; Sloss-Sheffield common 86; Cast Iron Pipe common 32, preferred 84%; Can common 13½, preferred 81.

The Union Brass Works, Detroit, Mich., has been incorporated with \$30,000 authorized capital. The company is erecting a factory at Rivard street and Harper avenue, comprising a two-story main building, 42 x 96 ft., and a brass foundry, 32 x 70 ft. Ground has been acquired for other buildings. The company expects to occupy the new buildings January 20 and will make a general line of brass goods, such as steam and gas fittings, automobile parts and specialties.

In the courts at Pittsburgh a decree of dissolution has been asked for by the Dexter Spring Company, Verona, Pa.

## Economy in Modernizing Machine Shops.

The machine shop which is struggling to solve the problem of meeting the market for its product will find that not alone in the substitution of special machinery for men's labor can manufacturing capacity be increased mechanically. The standard machine tool presents as important a field of enlarged production and of economy of labor, and in many works much more important. In most plants where machine tools constitute an important factor in manufacturing, the equipment has been gathered together during a period of years. It represents various epochs of design. Some tools were built before the modern practice was inaugurated and others, while comparatively new, cannot be classed with the latest creations of the designers. The replacement of an old machine by a new one usually effects a remarkable improvement in the amount of production. When the substitution is multiplied, the number of machines required and the corresponding number of men employed in that section of the shop must be cut down, else the balance of manufacturing will be destroyed by overproduction. To illustrate the case, a machine tool establishment had 36 lathes, in addition to which two machines of the latest type were installed for use on steel parts. The result was that the two accomplished what 14 of the older types had been doing, and at the same time made a gain of 10 per cent. for the lathe section. A number of these older lathes were sold and others are idle. The force of lathe hands has been cut enormously, reducing the stringency of labor. Space has been provided for other equipment. Investment cost and other overhead expense have been reduced as well as the payroll, because of the wise substitution of machines designed to secure the highest possible efficiency, in place of lathes, which, though still good, lacked the extreme capacity required by the work. The fitting of a battery of planers with a variable speed equipment has accomplished a 50 per cent. increase in the efficiency of that department. Let the same modernization be extended throughout a shop and a large increase in output must follow without a corresponding growth in the working force employed in machine operation.

No argument against this phase of improvement exists except that of the initial cost of the changes. After a period of dull business it may not be wise to reduce quick financial resources immediately. But if the means should be available the economy is a large one in itself. The shop produces more per average workman. In not a few shops production is greater to-day than it was when business was good a few years ago, though the working forces are actually smaller. No doubt this is largely due to improved standard equipment, though other elements enter into it having to do with better organization and system. The change means a great deal in its bearing on the labor question. If a large number of works should be able to take care of the natural growth of their business without increasing in the same ratio the number of men on their payrolls, the result must be very great indeed.

To accomplish the maximum economy the management must apply its best efforts to maintaining the balance of the shop. This matter is one always worthy of attention, for there is unnecessary expense where one section out-produces another, compelling periodic idleness for some machines. In installing more efficient tools an especially careful watch must be set. This is not a difficult matter if the shop system is a good one, but sometimes there is carelessness, and no one observes that some tools are compelled to shut down occasionally because they have performed their share of the work before other departments have finished theirs.

## Some Stewart Structures.

James Stewart & Co., 30 Church street, New York City, have just issued a book bearing the above title that is of especial interest. It is 8½ x 11 in. and has approximately 500 illustrations in its 204 pages. Although this firm is completing the sixty-fifth year of its existence under the same name and ownership, no attempt has been made hitherto to get out any printed description of the work of the company and the illustrations have been confined to representative examples of the work executed by the different departments of the firm during the past 10 years. Probably there is no other construction company which has handled so many large individual contracts that have covered such a wide architectural and engineering range. The character and scope of the work in which they are engaged vary widely, the contracts illustrated including office buildings, railroad stations, manufacturing plants, grain elevators, heavy masonry and reinforced concrete structures, dredging and dry docks. Only enough descriptive matter is given to briefly explain the illustrations. As a rule the engravings of each contract show the work under construction, together with the completed structure. The 100 different contracts illustrated are scattered throughout the United States, Canada and England. The latter are especially notable as they marked the beginning of the "American invasion of England" some seven years ago. Among the contracts illustrated are the plant of the British Westinghouse Electric & Mfg. Company at Manchester, the Midland Hotel at the same place, the Savoy Hotel at London and a number of power houses throughout England and Scotland.

The Standard Electric Works, Racine, Wis., has consummated a deal with the McCrum-Howell Company, New York, by which it disposes of its factory, together with the right to manufacture all household articles and certain other commodities. The Standard Works will continue to manufacture its electrical vibrators and massage devices as heretofore. The McCrum-Howell Company will take immediate possession of the plant, which it will enlarge as soon as weather conditions will permit, with the object of trebling the capacity. It will employ from 500 to 600 additional men when the new plant is completed.

Last week the annual convention of traveling representatives of the Pittsburgh Steel Company was held in Pittsburgh. Nearly 125 men were present and trade conditions and policies for the new year were discussed. On the evening of December 30 the company tendered its traveling representatives a dinner at the Fort Pitt Hotel at which Wallace H. Rowe, president, was toastmaster. Addresses were made by officials of the company and by some of the men. The occasion was thoroughly enjoyable.

P. H. Bonvillian and E. Ronceray, Paris, France, manufacturers of foundry molding machines, American patent rights for which have been controlled for the past two years by the E. H. Mumford Company, Philadelphia, Pa., have taken over their patents and equipment on hand from that company, and for the time will be represented by E. Espana, of the former concern, with headquarters at the Tracy, Thirty-sixth and Chestnut streets, Philadelphia, Pa.

Additional buildings for the plant of the Monitor Drill Company have been decided upon by the Moline Plow Company, Moline, Ill., and the company is now engaged in drawing plans for a cleaning and casting building, coreroom building, pattern vault building and a transforming and switchboard building.

## The Iron Industry of Mexico.

### Monterrey Plant Expanding While the Durango Works Are Now Idle.

BY JOHN BIRKINBINE.

Although Mexico is renowned for its mineral wealth, and among its resources are some deposits of iron ore of phenomenal size, its metallurgical history is mainly confined to the manufacture and fabrication of other metals. Prescott's "Conquest of Mexico" repeatedly refers to liberal quantities of gold dust and the use of this in quills as a medium of exchange or money. He instances the ability of the Aztecs in the early part of the sixteenth century as workers in gold and silver, and in using tools made of copper alloys to work stone, wood and precious metals. Iron seems to have been unknown or, at least, unused, and the same appears to have been true during a considerable part of the occupation of Mexico by the Spaniards.

#### Original Methods of Iron Making.

As the country was opened to foreign trade, utensils of which iron is the base were introduced, and in various parts of what is now the Republic of Mexico attempts were made to produce iron. The crude Catalan forge, following the Spanish design, was utilized, and a number of these ancient "ferrerias" are still in existence, and in the mountainous sections of the country some are active. These are practically open fires in which local ores mixed with charcoal are "brought to nature," formed into a loupe, hammered to remove the cinder, reheated and hammered into bars of merchantable sizes. These ferrerias are generally in mountain fastnesses, accessible by horse trail only, and are located on streams where the volume and fall of water permits of installing a trompe and a water wheel, generally of the overshot variety. These trompes are of ancient design and are practically boxes in which a falling body of water entrains air and on its relief compresses it sufficiently to be used as blast in the open fires. The water wheels operate wooden shafts on which cams are placed to engage the end of the helve hammer.

The activity of the ferrerias is dependent on the ability to secure ore and fuel and on the demand for the product. Generally their operation is irregular, a quantity of iron ore being mined, carried over the mountains in sacks on the backs of burros and sufficient wood cut and carbonized, which is also similarly transported. The amounts of these raw materials are gauged to meet the estimated prospective demand. When the product is nearing exhaustion the same process is repeated for another campaign.

The ores are used as dug, except in so far as hand sorting enriches them. The charcoal is inferior, made in meilers of small capacity in the forests much broken by the transportation process and mixed with dirt from the meilers.

#### Charcoal Blast Furnaces.

An advance step was taken when the blast furnaces were introduced into Mexico, but these were of small capacity, operated by cold blast. The product was a few tons per day, which was either cast direct from the furnace into molds or puddled with wood and rolled into shapes of approximate dimensions. The charcoal fed to the blast furnaces was of about the same character as supplied to the forges or ferrerias, and it and the ore and flux were transported to the plant on the backs of burros. Most of the furnaces, however, were accessible to main roads, on which it was permissible to employ either wheeled vehicles or the animals with burdens.

As branch railroads are being added to the present Mexican transportation systems, some of these blast

furnaces have their wagon or animal haul considerably reduced, but none which depend upon charcoal can be classed as thoroughly modern in equipment and facilities, except the plant of the Compania Fundidora de Fierro y Acero de Monterrey, at Monterrey, of which mention will be made later.

The older Mexican charcoal furnaces have stacks of stone, or stone topped with adobe braced with wooden vegas, and produce a few tons per day.

In the State of Jalisco an iron shell blast furnace with many modern features operates in connection with a rolling mill, the furnace fuel being charcoal, kiln dried wood being used for puddling and heating. Power is obtained from an adjacent waterfall.

#### The Blast Furnace at Durango.

At Durango a stone stack secured with iron bands is supplied with hot blast stoves and closed top, and blast is furnished by a steam-blowing engine. The rolling mill is also operated by steam. At this plant the fuel used was part charcoal and part coke in the furnace, and gas produced from bituminous coal was employed in the rolling mill, the works being accessible to the cretaceous coals of northern Mexico and having a railroad track running into them. This plant closely approximates northern conditions and has the advantage of obtaining abundant cheap ore from the Cerro de Mercado, the Iron Mountain, under whose shadow the works are located. This truly remarkable deposit of iron ore exposes above ground a greater mass than has authentically been determined elsewhere, and although averaging too high in phosphorus to be classed as Bessemer ore, it yields about 60 per cent. of iron and costs less than 1 cent per unit of metal delivered in the furnace. It is questionable if any iron industry in the Republic of Mexico can supply metal at a lower cost than that which may be made at Durango. Over-capitalization, mismanagement in the earlier stages of the enterprise, and later dissensions among the owners has prevented taking advantage of local facilities, and this plant is now inactive. Some of the ore from the Cerro de Mercado is carried to Monterrey to supply the larger plant, which has also, undoubtedly, influenced the market for the product of the Durango Iron Works.

The castings made at some of the older blast furnaces still operating in the State of Hidalgo and the wrought iron produced at these plants have a high local reputation in the capital, and notwithstanding the manufacturing of steel in Monterrey and the liberal importation of all kinds of iron and steel products, it is probable that these works, although far from modern in construction and operation, will continue as factors in the iron and steel industry of Mexico. Moreover, the difficulties of transportation will also permit of the local ferrerias, which have been mentioned, supplying limited areas with their output.

To encourage the continuation of railroads and industrial development the Mexican Government has admitted great quantities of iron and steel manufactures under concession which omitted import duties entirely or partially, but the national policy favors protection and stands ready to support in this way domestic manufacturers, which satisfy the officials that a market demand can be met by home products.

In the City of Mexico and some of the larger cities great amounts of scrap are utilized either in foundries, where the scrap mixed with pig iron is fed to the cupolas, or in gas-fired furnaces, where the material is bushed and passed through rolls to form commercial products. Wire is also brought into the country and fabricated into nails.

#### The Steel Plant at Monterrey.

With the opening of the new century a pretentious effort was made to modernize the production of iron and steel at the city of Monterrey (635 miles from the

City of Mexico), just outside of which is located the plant of the Compania Fundidora de Fierro y Acero de Monterrey. This consists of a steel shell blast furnace 18 ft. in diameter and 80 ft. high, supplied with four hot-blast stoves and ample boiler power to operate the compound condensing blowing engines. The product of 300 to 350 tons daily is tapped molten into ladle cars, except when it is necessary because of disarrangement to utilize the casting house. The furnace is fed with coke, part of which is from the domestic mines near Esperanza, Coahuila, and part is imported from foreign countries. Ore is obtained from deposits distant from 100 to 200 miles, and part from Durango, which is 400 miles distant. Local limestone is abundant and the ore mixture approximates 60 per cent. of metallic iron. The molten metal from the furnaces is carried to a Bessemer converter, where it is partly blown, and from this fed to three 35-ton open hearth furnaces, a fourth being now under contract. The ingots made are placed in soaking pits and when sufficiently reheated are run through the blooming train into billets, and these in turn through the roughing mill and finishing mills, which are equipped to make either rails or structural shapes.

In 1909 the value of these products from this plant approximated \$3,000,000 gold, and included a large order for rails for the Government railroads, some of which weighed 80 lb. per yard. The management anticipates increasing their output in the year 1910 to a value of \$5,000,000 gold.

#### PROMISE OF GREATER HOME COKE SUPPLY.

A number of the iron ore deposits in Mexico have been examined and reported upon, but any contemplated plan of magnitude in Central or Southern Mexico has been handicapped by the necessity of importing fuel. However, as in the last two years, extensive explorations have been carried on in the western part of the State of Oaxaca, distant about 300 miles from the capital, beds of coal have been determined which give promise of adding materially to the domestic supply of fuel for the Republic of Mexico.

The number of available water powers also has encouraged investigations into electric smelting, and it is not improbable that among the improvements to be inaugurated as features of this, the centennial year of Mexico's independence, the manufacture of iron and steel may attract attention.

#### CONTRACTS FOR NEW STEEL MILLS.

The Morgan Construction Company, Worcester, Mass., has been given the contract by the Jones & Laughlin Steel Company for a continuous 21-in. and 18-in. billet and sheet bar mill, for the Allequippa Works, Allequippa, Pa.

The Republic Iron & Steel Company has ordered from the Morgan Construction Company a 21-in. and 18-in. mill of the same type, to be located at Youngstown, Ohio.

Meetings of the American Society of Mechanical Engineers will be held in New York, January 11, in St. Louis January 15 and in Boston January 21. The spring meeting of the society will be held this year as usual, in addition to the London meeting, which occurs in July. Atlantic City has been selected as the place for the spring meeting, and it will be held from May 31 to June 3, inclusive. The headquarters during the meeting will be at the Hotel Marlborough-Blenheim.

The Multnomah Mechanical Mfg. Company, Fort Worth, Texas, is seeking a location in the Southwest for a plant to manufacture a gasoline traction engine. The engine is of 10 hp., and adapted to plowing and breaking mesquite land.

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## The Machinery Trade.

### The New York Market in 1909.

NEW YORK, January 5, 1910.

The year 1909 will be remembered in the machinery trade as an unusual one, opening as it did with a disappointing lack of demand for machinery of all description, and ending with four months' of rush business which in some lines equaled the record breaking business of 1906 and 1907.

There were reports early in the year to the effect that many large enterprises which were abandoned in the panicky times of 1908 would be taken up, but as the weeks went by and business remained dull, machinery men began to lose hope. The railroads were absolutely out of the market as far as lists were concerned until late in February, when the Delaware, Lackawanna & Western Railroad came forward with a list covering \$150,000 worth of requirements for its Scranton shops. This list attracted more attention in the trade at that time than some \$300,000 lists did later in the year. Unfortunately, however, the authors of the list decided after getting prices to defer purchasing for a time.

One of the surprises of the early part of the year was the action of the leather belting manufacturers in raising prices about 10 per cent. in the face of a disappointing demand for material. The advance was well maintained throughout the year, although it was made at a time when many machinery men were talking of reducing prices because of cuts made by leading interests in prices of iron and steel. Early in March business was still aggravatingly dull but toward the end of that month the Maxwell-Briscoe Motor Company asked for a good sized list of machine tools and followed it by purchasing more than \$300,000 worth of equipment during the year. Other automobile manufacturers came into the market and the demand for machinery from that source was surprising. Other lines remained dull, however, and the automobile requirements during March and April was salvation to some houses in the trade. Along about June pessimistic ones predicted that the approaching vacation season, coupled with the proposed tariff changes, would about kill business for the year, but they were doomed to disappointment as a positive buying movement came in July. Previous to that time the prosperity prophets, some of whom were predicting on speculation rather than on faith, had made so many assertions in that direction that little stock was taken in their statements. Accordingly the healthy demand for machinery which came during the "dog days" of the year was a surprise.

#### The Revival of Business.

The American Locomotive Company distributed large orders and the Delaware, Lackawanna & Western Railroad placed orders against the large list issued earlier in the year. There were other large purchases with the result that within two weeks during July contracts were placed with New York machinery houses for more than \$800,000 worth of machinery. Then the railroads came out for machinery and, seized by the fear that prices would be raised as a result of the sudden great demand, other large users of machinery began to buy. Although the automobile trade ceased, from this on, to be the mainstay of the business there were continued heavy purchases from that source during the year.

Prices began to stiffen at this time and all concessions were removed on most lines. The machine tool builders, especially, began to ask higher prices and they began to fall behind in their deliveries on some lines. Late in September the leather belting people made a further advance of 10 per cent. and they explained that the raise was made because of the increasing price of hides. There arose in October a strong demand for machinery from small manufacturers and the dealers began doing a very profitable business in selling small lots of equipment here and there. This business was found especially desirable because in many cases the competition was not great. Consequently the railroads who are close buyers were not given so much attention and when the Intercolonial Railway of Canada came into the market in October for a large list of requirements many houses refused to bid because they could make more money supplying smaller buyers.

The inability of builders of some classes of machine tools to make deliveries as early as their customers desired advanced prices on second-hand machine tools to a point where they were costing more than they ever had before in the history of the trade. In some makes of lathes, planers and milling machines especially, a first-class second-hand machine could not be obtained for less than at least three-quarters the price of a new machine of the same make. Many people who found themselves in need of machine tools to get out urgent orders came into the market for second-hand tools and most of them considered deliveries rather than the cost of equipment. The delivery question became

a serious one in many lines and some manufacturers toward the end of the year refused to promise deliveries of planers, millers and shapers under from three to five months. The end of the year was marked by a great influx of orders from all sources. There was an absence of large lists but a more profitable demand existed in the way of orders for small lots of tools. The largest buyer in November and December was the American Locomotive Company, whose orders during those months aggregated expenditures amounting to \$200,000. The large steel plants of the East came out for some good sized requirements and the month closed with a volume of business that indicated that the end of the year holidays had but little effect on the trade.

The export trade was far better proportionately than the domestic trade early in the year and in the spring France and Italy were large buyers of machine tools and automatic machinery. In March and April a large amount of machinery was purchased for export to Cuba and the British West Indies for use on large sugar plantations, and toward the end of the year Europe began to call for machine tools in good sized quantities.

#### Prospects for the New Year.

The question of establishing closer relations between machinery dealers and manufacturers came in for much discussion at the meetings of such organizations as the National Metal Trades Association, the National Machine Tool Dealers' and the National Supply & Machinery Dealers' Associations, and the coming year may see a formal agreement entered into between the latter organizations and the more prominent manufacturers associations covering the settlement of questions that arise between dealers and manufacturers.

The new year opens with a good supply of orders on the books of most machinery houses and some good business in sight. There are no large projects actually before the trade just now but the volume of business in view as indicated by inquiries from the general manufacturing field is large. Some large enterprises that were postponed during the panic are expected to develop, and if business continues good the year may see an unprecedented demand for machinery. If the trade gets as much patronage during the coming year as it has during the last three months this will undoubtedly be the case.

#### Proposed Railroad Improvements.

Work on a number of railroad extension projects, which were begun during the last year, have been carried into the new year, and these enterprises, together with new work already mapped out by some of the railroads, give promise that the railroad buying during 1910 will be larger than it has been since 1906. Many of the more important railroads do not plan additions or extensions until the first meeting of the year and improvements of these roads are yet to be heard from. Letters received by *The Iron Age* from the majority of large railroad systems of the country indicate that improvements are planned by many of the roads. The Baltimore & Ohio Railroad will be one of the largest purchasers of machinery for railroad shops from all accounts. The railroad now has under way improvements at Benwood, W. Va., which include expenditures of about \$22,000 for a power plant, generators, pumps and other machinery, and the company has made an appropriation during the year for tools and other machinery equipment to be distributed throughout the repair shops of the company's system.

The Northern Pacific Railroad Company, St. Paul, Minn., is planning some large improvements and arranging for additions to its shop equipment, but as yet the amount of money to be spent has not been determined. The St. Louis Southwestern Railway Company, St. Louis, Mo., has already contracted for \$70,000 worth of machine tools to be installed in connection with the extensions of its repair shops at Tyler, Texas, and deliveries on this equipment will be made during the year. The Lake Shore & Michigan Southern Railroad has appropriated about \$14,000,000 for improvements, \$600,000 of which are for new shop buildings at Elkhart, Ind. The Toledo, St. Louis & Western Railroad Company and its allied railroad interests intend, if labor conditions settle down to a point where the company can look ahead with any degree of certainty, to carry out a number of large projects which it is stated those interested are not in a position to make public as yet. The Cincinnati, New Orleans & Texas Pacific Railroad Company, Cincinnati, Ohio, will concentrate its extensions this year in the way of constructing passing tracks, double tracks, and generally systematizing its operating facilities. The Central of Georgia Railroad Company, Atlanta, Ga., is at present expending about \$1,000,000 on its new shops at Macon, Ga., and these improvements will extend over into the new year so that no new work of any moment will be undertaken. The Cincinnati, Hamilton & Dayton Railroad Company, Detroit, Mich., will spend several million dollars during the year, but its plans have not been formulated so that any definite statement of its contemplated additions can be made as yet.

Among the companies that have not as yet made up

their programme of improvements for the coming year, but which intend to make purchases are the Pennsylvania Railroad, Philadelphia, Pa.; Chesapeake & Ohio Railroad Company, Richmond, Va.; Atlantic Coast Line Railroad Company, Wilmington, N. C.; Chicago, Rock Island & Pacific Railroad Company, Chicago, Ill.; New York, Chicago & St. Louis Railroad Company, Cleveland, Ohio; Missouri, Kansas & Texas Railroad System, St. Louis, Mo.; Illinois Central Railroad Company, Chicago, Ill. The Delaware & Hudson Company, 32 Nassau street, New York, states that it will make no extensive improvements to its system until the restrictions imposed on the operations of the company by the New York Public Service Commission are removed.

The Public Service Railroad Company of New Jersey has under construction at Nineteenth street and Orange avenue, Newark, N. J., a repair shop 60 x 180 ft. in size for which it will probably need some machinery equipment. The Boston & Maine Railroad is establishing at Somerville, Mass., a large repair shop system, the first section of which will be 170 x 203 ft. Work on this new plant is now well under way and the company expects to spend between \$1,500,000 and \$2,000,000 on its shops at Somerville before its plans are completed. It is understood that the Chesapeake & Ohio Railroad Company will make some improvements to its shops at Huntington, W. Va., and will make some additions at Richmond, Va. The Chicago, Milwaukee & St. Paul Railroad Company is arranging to construct at Tomah, Wis., a plant for manufacturing railroad bicycles and hand cars on which no machinery list has as yet been issued.

The Erie Railroad of New Jersey is arranging to move its Bergen shops, near Jersey City, to large shops which are to be erected on the Hackensack meadows at Hackensack, N. J. The improvements will include a machine shop, blacksmith shop, round house and power house, and the initial expenditure will be about \$50,000. The Kansas City & Southern Railroad is planning for new shops at Shreveport, La., which will entail a good sized expenditure. A large amount of money has recently been spent by the Long Island Railroad in electrifying its system, and it is stated that before the improvements are completed \$10,000,000 more will be required to carry out the company's plans.

Among the items of expenditures covered by the recent bond issue of the New York Central Railroad authorized by the Public Service Commission, are \$350,000 for car repair shops at East Buffalo, N. Y.; \$340,000 for car repair shops at Avis, Pa., on the Pennsylvania Division, with \$40,000 for machinery equipment; \$674,000 for the elimination of grade crossings at Buffalo and extensions to freight yards at East Buffalo; \$476,000 for double tracking the Niagara Falls branch; \$94,000 for rebuilding the bridge over the Erie Canal at Tonawanda, N. Y.; \$100,000 for additional land for passenger station at Buffalo, N. Y., and \$1,500,000 for a new passenger station at Rochester, N. Y. This company will also spend a large amount of money for electrification which will include the electrifying of the West Shore Railroad between Syracuse and Utica.

An important machinery prospect that will come up about March 15, will be the requirements of the New York, Westchester & Boston Railway Company for its new shops. J. L. Crider, who is chief engineer, with offices at 63 Beaver street, New York, states that several unforeseen matters have delayed the company in carrying out its plans. He names the above date as when all arrangements should be completed and machinery lists ready to put out.

The Atchison, Topeka & Santa Fe Railroad has plans for railroad shops and a round house to be built at Sweetwater, Texas, and it is proposed to spend about \$30,000 on the work. Work may be deferred for two years, according to a statement made by the company.

### Some Large Manufacturing Enterprises.

Work was begun last year on a large number of new manufacturing plants and additions to existing plants are being carried over into the new year. Many new propositions which have been planned will be carried out. Among the most important are the projects of iron and steel companies which are given in detail elsewhere.

W. Ames, 312 Washington street, Jersey City, N. J., is building a plant for the manufacture of spikes and bolts. The machine shop will be 50 x 100 ft. and there will be several other buildings. Charles H. Higgins, 15 Exchange place, Jersey City, is the engineer in charge of the building construction.

The American Car & Foundry Company, Detroit, Mich., has let contract for a one-story addition to its plant which will be 60 x 1000 ft. and which will cost about \$60,000. The company is at present spending about \$50,000 on machinery to bring its existing plants up to date.

The Bullard Car Door Equipment Company, Birmingham, Ala., has acquired a site on which it will erect a new plant. Plans are not as yet completed but it is understood that the enterprise will call for large expenditures for machinery.

The Birmingham Rail & Locomotive Company, Birmingham, Ala., is arranging for the building of an addition to its plant for repairing railroad equipment. The company has

purchased about 8 acres of land and will erect steel buildings, the size of which has not been determined.

The DeShaum-Hornell Motor Company, Hornell, N. Y., has let contract for the construction of its new factory, two stories, 60 x 200 ft., of brick and steel construction. Considerable equipment of lathes, drills and other machinery will be required.

The Gillette Safety Razor Company, Boston, Mass., is preparing plans for a large plant to be erected on Frelinghuysen and Evergreen avenues, Newark, N. J. The company has purchased a tract of land 809 x 1042 ft. and it is stated that a plant costing about \$200,000 will be built there. This will necessitate the purchase of considerable automatic machinery used in the manufacture of frames for safety razors as well as some fine blade making equipment and grinding machinery.

The Great Lakes Engineering Works, Detroit, Mich., is arranging for the erection of a new shipbuilding plant at Ashtabula, Ohio. The company will spend about \$1,000,000.

The General Motors Company, Detroit, Mich., will erect a large automobile manufacturing plant in that city to cost about \$2,500,000. The buildings to be erected will include a central machine building with two wings each 90 x 256 ft., three stories, and a central pavilion, 90 x 436 ft., three stories.

The recently incorporated Federal Terra Cotta Company, 111 Broadway, New York, will build a plant, the main building of which will be 250 x 600 ft., for the manufacture of architectural terra cotta. Considerable in the way of special machinery will be required.

The International Steam Pump Company, New York, has been heavy purchasers of machinery of late and it is understood that additional buying will be done during the year, as plans are under way to extend some of the company's manufacturing facilities. Several months ago the company appropriated \$1,000,000 for building extensions, and only a small part of this, it is understood, has been spent as yet.

The Jacobson Machine Mfg. Company, Warren, Pa., has under construction a plant for the manufacture of a new type of automatic gas engine. An addition will be made to the machine shop and it will be 65 x 165 ft. in size.

The Otto Konigsow Mfg. Company, maker of sheet metal stampings, has secured a new site for a plant in Cleveland, Ohio.

The Kansas City Steel Scraper Company, Kansas City, Mo., will build a plant on which \$750,000 will be spent in equipment. The company has purchased 30 acres of ground.

Plans are being prepared for a large foundry to be built in Newark, N. J., by the Edward Maher Sons' Iron Foundry, the machinery equipment for which has not yet been purchased.

A large amount of machinery will be required by the King Sewing Machine Company, Buffalo, N. Y., which is erecting a plant at a cost of \$150,000.

A general line of machinery used in the manufacture of wood and industrial cars will be required by the Wonham-Magor Mfg. Company, 30 Church street, New York, whose plant at Athenia, N. J., was recently destroyed by fire.

### Power Plant Projects.

Manufacturers of power plant equipment were not as busy during the past year as people in other lines, chiefly because most of the purchasers of machinery were making additions to existing plants where they had ample power. A number of large hydro-electric power plant enterprises have come forward during the year, however, and some of them will bring business in 1910. D. G. Ziegler & Co., Jacksonville, Fla., have organized the Savannah Hydro-Electric Construction Company, with a capital stock of \$300,000, which will build water power electric plants in Georgia, Alabama, South Carolina and Florida.

J. G. White & Co., 49 Exchange place, New York, is building a large hydro-electric plant on the St. Lawrence River, near St. Timothee, Quebec. It is proposed to develop 21,600 hp. with an idea of future development.

The St. Petersburg (Fla.) Electric Light & Power Company is obtaining figures on a large power plant which will be built during the next four months.

The North Carolina Electrical Power Company is building a hydro-electric plant near Marshall, N. C., which will develop about 4600 hp. The requirements will include transmission lines, &c.

It is probable that the New York Edison Company will build the large power house it proposed to build at 201st street, New York, two years ago. The machinery requirements for this project, which was abandoned for the time being, will amount to millions of dollars.

The Lehigh Coal & Navigation Company, Philadelphia, Pa., plans to build a power plant on its property near Nesquehoning, Pa. Plans have not as yet been perfected.

The construction of the Catskill aqueduct now under way in Ulster County, N. Y., has brought considerable business to New York machinery houses. This big aqueduct will be 100 miles long and will cost \$161,000,000. A number of the sections have been let, but there is still some to give out and all of the contractors who are at work have established offices at the aqueduct and are buying heavily.

The American Cement Engineering Company, 315 Fifth avenue, New York, is building two cement plants on the Hudson River with a combined daily capacity of 12,000 barrels. The company has been large buyers and it is understood that work has not as yet been completed.

The General Electric Company, Schenectady, N. Y., has for a time been considering the construction of an electric plant at Erie, Pa., at a cost of several million dollars. The company has made numerous additions to its plant of late and the demands on its resources may bring about the construction of the plant in question within the present year.

#### The Week's News.

The Globe Malleable Iron Company, Syracuse, N. Y., is in the market for forging machinery and other equipment.

A pumping unit will probably be purchased about February 15 by the municipal authorities at Livonia, N. Y. Specifications have not yet been drawn.

Some new boiler and tank making tools will be required before long by the Henry Vogt Machine Company, Louisville, Ky., which is taking a large number of orders in the Southern States, Mexico and Central America.

The Larkin Company of Buffalo, N. Y., is increasing the capacity of the power plant at its branch factory in Memphis, Tenn., having ordered a generating unit of 300 kw. capacity and auxiliary apparatus.

Sawmill and planing mill machinery will be required for extensions to its plant which the South Amboy, N. J., Lumber Company is planning.

The Morrow Ball Bearing Drill Chuck Company, Elmira, N. Y., will probably enlarge its plant this season, having taken some heavy time contracts from automobile companies.

The Lobdell Car Works, Wilmington, Del., will install open hearth furnace equipment, including Tate oil burners.

From Memphis, Tenn., it is reported that the Sen Mfg. Company of Egg Harbor, N. J., will build a large woodworking plant there, to be motor driven.

The Humphrey Brick & Tile Company, Brookville, Pa., is in the market for a gas producer.

The addition to the Connellsville, Pa., Iron Works, recently noted in *The Iron Age*, has been completed. This company advises it will be in the market in the near future for a bulldozer, press, a belt driven hammer and punch. It also has under consideration the purchase of a Williams-White electric press.

## New England Machinery Market.

### A Review of the Year.

BOSTON, MASS., January 4, 1910.

The year 1909 was one of promise with every branch of the machinery trade, and also one of fulfillment. Some lines have returned to the most excellent condition of business which they enjoyed in 1906 and the first few months of 1907. Others, while not yet reaching the maximum, are rapidly approaching it. It will be remembered that there was a market spurt late in 1908, which was followed by the usual depressing influence which comes with inventory taking about the first of the year. Then business began to improve rapidly and reached a high mark in May, and this was followed by the usual recession which culminated at midsummer. From that date orders have increased somewhat gradually but constantly, the average of each month being better than that of the month preceding it. Late December brought again the slight falling off which may be expected to continue into January. Then, unless the expectations of the best observers are very far wrong, the curve of trade will ascend to a point which has never before been reached in the metal trades.

In New England the automobile industry, though important, is not nearly so great a factor as in the Middle West, and its influence upon the market was not so important. The manufacturers of machinery and other equipment have prospered through the orders of their agents in the automobile territory, especially the builders of grinding machines, milling machines and other tools which play an important part in the building of motor cars. But the dealers did not share in this market to any great extent. The first great influence which increased their sales was the textile machinery industry, notably cotton machinery. The cotton manufacturers of New England spent many millions of dollars during the year in increasing their plants by the addition of new buildings, and also by the replacing of older machinery by new. This is also true of the industry in all parts of the country. The silk manufacturers have also grown in a very large way. New England being the greatest center of textile machinery manufacturing has profited accordingly. These shops began to increase their machine tool equipment in 1908, and have continued as

buyers up to the present time. Another important element of trade has been the manufacture of automobile accessories and parts.

The electrical industry was somewhat slow in starting, but during the year has reached a normal condition, and is now passing that point and entering into the condition of forced production. The builders of power equipment have had a prosperous year. The engine people are very well satisfied with the orders booked, and the boiler makers have had an even better year, for not only have they equipped many new power plants but in a great many cases owners of industrial plants have replaced their old boilers by larger units. The combustion engine builders have been very busy, thousands of these motors have been produced for the automobile manufacturers, and the demand for the marine type has been correspondingly good.

The railroads did something toward improving their shop facilities during 1909, and promise to be large buyers in the next year or two. The Boston & Maine will have completed the first section of its great shops at Somerville before the end of the year, together with the shops at Fitchburg and at Mystic Wharf. The New York, New Haven & Hartford Company has made no announcement of its plans for new shops in Weston, Conn., but those who are following the situation with this company believe that some move must be made almost immediately if the road is to maintain a balance between its repair shops and its rolling stock. The Boston & Albany Division of the New York Central has added somewhat to its shops at West Springfield. It is not known that any further extensions are planned. The electric railroads do not promise to be large buyers. The projected high speed line between Boston and Providence will require shops, and including its power station, car equipment and the other mechanical factors in electric railway practice, the total of its buying will be very large. It is known that this project is strongly backed financially, and the obstacles to its right of way do not seem serious enough to impede the progress of the enterprise.

An important improvement to railroad shop facilities will be the new works of the Osgood, Bradley & Sons Company, Worcester, Mass., which are now under construction at Greendale. The group of large buildings will have a great producing capacity, as compared with old shops of the company which have been wiped out by the work of eliminating the city's grade crossings.

The brass industry, of which Connecticut is the greatest of all centers, is exceedingly prosperous, the year having converted it from a condition of mediocre business to one which nearly equals the flush times of 1907. Most of the mills of the Naugatuck Valley have added to their capacity in the last two years, and many of the factories which convert brass into manufactured articles are also larger than when they were last rushed to keep up with the demand for their products. The wire mills of Worcester and other New England cities are running on close to full capacity. The works of the American Steel & Wire Company are perhaps not quite so busy as they were a month ago, which is a natural change at this season. But some of the independent concerns are still producing at almost the extreme tension. The works of the American Steel & Wire Company have not been enlarged to any considerable extent, but some of the smaller makers have increased their plants.

Taking New England as a whole, the capacity of the machine tool industry has been largely increased as compared with what it was at the height of the market in 1906. Extensions begun while the business prospect was bright had not been completed when the market broke. To-day these and more recent enlargements are equipped and are taking their part in production, so that the machine tool manufacturers are very much better able to take care of their customers than ever before. It is probably no exaggeration to state that the aggregate production of machine tools in this territory is very close to what it was in 1906.

An important addition to the group of machine tool concerns is the Bryant Chucking Grinder Company, Springfield, Vt., which is building a grinding machine the scope of work of which is similar to that of the turret lathe. The company occupies a new shop which is well equipped for its purposes. It may be considered an offshoot of its great neighbor, the Jones & Lamson Machine Company. Another new industry which promises to be very important is the Springfield Crude Oil Engine Company, Springfield, Mass., which will build a combustion engine of simple design, using crude oil as a fuel. The first unit of an extensive plant is about to be built. An important change which has come during the year was the purchase by the Automatic Machine Company, Bridgeport, Conn., of the plant and business of the Pacific Iron Works of that city. The plant has been enlarged by the erection of new buildings, and the new owner now has ample space in which to continue its very rapid and prosperous growth. The Carlyle Johnson Machine Company has made an important move by taking a large factory building in Manchester, Conn., and removing its business from Hartford to that city. Providence, R. I., now enjoys the convenience of a local drop forging plant.

The Roren Drop Forging Company has taken the plant of the Bullard Automatic Wrench Company in the suburbs of the city and has begun a general drop forging business in addition to the manufacture of some special lines of its own.

The New England territory has lost few industries, an exception being the removal of the business of the Atlas Machine Tool Company, Taunton, Mass., builder of grinding machines, to Erie, Pa., where it has been absorbed by the Modern Tool Company.

The enlargements, completed and under way, of manufacturing plants in metal lines in New England have aggregated a largely increased manufacturing capacity. The plant of the Windsor Machine Company, Windsor, Vt., now under construction, will be a very large one, permitting of a very important increase in production of Gridley turret machines. The Blake & Johnson Company, Waterbury, Conn., is occupying its new factory, which is given over to its hardware specialty department. Other additions have been numerous.

The Wheelock Rust Proof Fence Company, Worcester, Mass., is building new works at Clinton, Mass., for the manufacture of wire fencing. The building will be 50 x 100 ft., three stories, of heavy mill construction. In the beginning the company will have its galvanizing done outside, but proposes to install a galvanizing plant a little later.

The shops of the Royal Motor Works, Inc., Worcester, Mass., manufacturer of motor cycles, were seriously damaged by fire recently, including loss on machine equipment. However, much of the finished stock was stored in another building, so that no delays in shipments have resulted. No decision as to location of the new shops has been reached.

The American Pin Company, Waterbury, Conn., has increased its capital stock from \$300,000 to \$600,000. No plans for enlarging the large factory are ready for announcement, the company states.

The Phillips Insulated Wire Company, Pawtucket, R. I., has increased its capital stock to \$2,000,000, which means a large amount of new money. The company states that no plan exists at present for enlarging the works.

The business of the Exeter Machine Works, Exeter, N. H., has been purchased by Joseph H. Symonds, Boston, who will reorganize the corporation. The company manufactures steam engines, boilers, blowers, exhausters and steam and hot water heating apparatus. These lines will be continued and others added. William Burlingame, who has been the agent and treasurer for a long time, will retain an interest in the business and will serve as a director.

#### The Week.

The trade is beginning its new year without the slightest doubt of a twelve months of business which will create a record of prosperity. No one is able to find a flaw in the situation, unless it be a fear that deliveries will act as a brake so strong as to keep the volume of orders considerably below what they would be were stocks to be had to meet the continued, exhausting demand. Vigilant customers are preparing to place their business as soon as stock-taking is completed. Every branch of the trade is included in the statement, the condition reaching out into the remotest ramifications. The same thing is true of the supply business.

Labor conditions continue satisfactory. Wages have advanced a good deal in the machine shops. The policy of many progressive concerns has been willingly to increase the rates to meet the market, as a safeguard against encroachments upon their working forces from outside employers, and the result in such cases has been that organizations have been impaired to a less extent than usual under conditions of scarcity of skilled workmen. In the ordinary course of events, under the laws of supply and demand, labor has sought those centers which have shown a tendency to meet the labor market as it exists, leaving such places as strive to keep down wages. The result is a final equalization, in which those who have been slow in acknowledging the situation have been compelled finally to give the standard rates. The number of these latter instances is less than usual. The Eastern New England and District Council of Machinists' Lodges met at Boston Sunday and voted to request a 20 per cent. advance in wages. Probably the average increase already approaches that figure. Many of the New England cities and towns where machine shops are important factors in the industrial community are without machinists' unions, and little trouble from this source is apprehended where the unions have obtained a foothold. The unions represented in the Eastern District include employees of some of the large railroad shops, who are probably interested in the general increase in wages which the railroad men of this territory propose to ask for. No signs of unrest are seen in the foundries.

The result of increases in wages, brought about in the treatment of the situation by individual contract with the men, is important enough to enter into the price of manufactured articles and the increase in machinery prices will extend through many lines other than machine tools.

Announcement is made that the New York, New Haven & Hartford Railroad will ask the Massachusetts Legislature

at its present session for legislation which would mean the electrification of both the North and South terminals, Boston, involving the expenditure within the zone of between \$50,000,000 and \$70,000,000. The project includes a tunnel under the city of Boston connecting the two terminals, which would be of enormous importance to business interests, particularly in the handling of freight, a work which is now expensive because it entails hauling vast quantities of goods by team across the city.

The Connecticut Mfg. Company has been organized at Waterbury, Conn., to manufacture metal goods. The factory will be located in that city, but beyond this the company is not ready to make announcement of its plans. The capital stock will be \$25,000 and the incorporators are Charles H. Swenson, John Swenson and Amos H. Osborne, all of Waterbury.

#### Philadelphia Machinery Market.

PHILADELPHIA, PA., January 4, 1910.

As was to be expected, the past week has been rather quiet; both makers and users of tools have been busy with arrangements for annual inventories, while the effect of the snow storm of 10 days ago was still a considerable hindrance to the usual transaction of business. It is believed that the resumption of business in general will be somewhat slow, at least until the year end features of the trade have been disposed of. As far as transactions during the month of December are concerned, both manufacturers and merchants report a very satisfactory number of orders; in some instances the past month was the best of the year, and a number of manufacturers not only reached normal productive capacity, but have been working overtime in order that they might be able to meet the growing urgent demand. The situation on the whole has been steadily improving, and the question of deliveries is becoming an important one in many branches of the trade, manufacturers of some classes of tools now being months behind on the more popular sizes of tools made by them. Sales during the week have not been of any particular importance; some business which has been pending was closed, but most of the few transactions noted were of a single tool character.

The foreign market is quiet; some few inquiries for tools of special character are to be noted, but business on the whole has been slow.

The second-hand machinery trade has been dull, a seasonal condition at this time, while the same conditions are to be noted in the boiler and engine trade.

Foundries have been giving considerable attention to annual stock taking, quite a number being temporarily shut down for that purpose. New business has been quiet in this branch of the trade.

The American Ice Company has obtained permits from the Bureau of Building Inspection for the erection of a two-story brick ice plant, 23 x 121 ft., at the southeast corner of Ninth street and Washington avenue.

The Elwood Ivins Tube Works, Oak Lane, Philadelphia, informs us that it has practically doubled its volume of business during the past year. At present it is from four to five months behind on its orders. Plans are being considered for further increasing the facilities of the plant during the coming year.

Watson & Huckel, architects and engineers, have completed plans for a 10-story light manufacturing building, which the Estate of Henry C. Lea proposes to erect at the southeast corner of Broad and Spring Garden streets. The building is to be steel and concrete and will be equipped with passenger and freight elevators, steam heat, electric light and power.

The Reading Abattoir Company, Reading, Pa., has, it is understood, acquired property at Second and Pine streets, in that city, on which it will build a complete abattoir and ice-making plant. Plans comprise a group of buildings, the contract for the erection of which is said to have been awarded to Lambert Rehr, contractor, Reading, Pa. Particulars regarding the company's requirements have not been obtainable.

The Standard Pressed Steel Company reports a very satisfactory volume of business during the past month. December has been the best individual month in point of orders received that this concern has had for a long time, a particularly good volume of business in Hallowell patent countershaft hangers being noted. Business during the past year was about equal to that transacted in 1907, and shows a gain of about 40 per cent. over that of 1908. The prospects for an active year, both in the foreign and domestic trade, is considered very favorable.

Formal announcement has been made of the transfer of the Baldwin Locomotive Works, by George Burnham and others, to the corporation of that name, also the increased

capitalization of the new concern to \$20,000,000. These are simply the legal announcements in connection with the policy which the new corporation adopted at its formation in July of last year.

The Baldwin Locomotive Works announces a seasonable quietness in business at this time.

The Royersford Foundry & Machine Company, Royersford, Pa., reports many inquiries for punches and shears, and that it has recently taken a number of orders. A short time ago the A. D. White Machinery Company, Chicago, was shipped a carload of its tools, while Henry Frank, Jr., New York, has just placed an order for a No. 3A punch and shear. Orders for the above company's line of power transmission machinery has exceeded expectations in that line.

The Bruce-Macbeth Engine Company, Cleveland, Ohio, gas engine builder, has opened a branch office in Philadelphia, at 1020 Drexel Building, in charge of M. E. Jackson.

### Cincinnati Machinery Market.

CINCINNATI, OHIO, January 4, 1910.

It has been a week of the usual inertia in machinery lines, speaking strictly of the sales features, but from the shop and factory viewpoint the closing days of the year and the flight of holiday week furnished a new record of mechanical activities. There were very few interruptions in the local tool manufacturing districts on account of the holidays. Only such departments were shut down for a day or two as it was found could not be operated, and these were very few. Statistics gathered by the *Enquirer* show an increase of about 40 per cent. in the volume of business over the preceding year, and but \$5,000,000 below the phenomenal record of 1907. It is the belief of the better informed in tool manufacturing circles that the latter record will be outdone this year, and, showing the prevailing optimism, they point to the preparations going on in all districts for improvements, enlargements or entirely new plants.

Many of these improvements have been mentioned from time to time in *The Iron Age* as they have developed—notably the immense concrete foundry building begun by the Lunkenheimer Company in 1907, but stopped on account of the panic, now being rushed to completion and awaiting installation of equipment which can not be made earlier than March; the Laidlaw-Dunn-Gordon plant of the International Steam Pump Company, investing about \$200,000 in additional buildings and equipment, increasing the capacity about 25 per cent.; Cincinnati Milling Machine Company, Cincinnati Planer Company, Triumph Electric Mfg. Company, all three building new and handsome plants in Oakley, the last named being already installed therein; and the Peck-Williamson Heating & Ventilating Company, also a part of the Oakley colony with its own foundry building just equipped and put into service. In addition to these the enlargements and improvements planned by the Sebastian Lathe Company, Covington, Ky.; further enlargements and additions to the plant of the Lodge & Shipley Machine Tool Company, of \$100,000 or more; improvements just finished by the H. L. Brown Fence & Mfg. Company in Linwood, which will increase its capacity 40 per cent., and constitute that concern one of the greatest of its kind in the United States; extensive improvements under way by the Cincinnati plant of the Allis-Chalmers Company—the Bullock Electric Mfg. Company—both in buildings and equipment; the Rock Island Battery Company, which early this year will move into its new plant at Winton Place, and the Cincinnati Car Mfg. Company, which will erect a new building 150 x 255 ft., and has under consideration additional buildings.

Among the large establishments which find their present quarters inadequate and the problem of enlarging on their present site impracticable, is the American Tool Works Company whose plant at Sixth street and Eggleston avenue is one of the landmarks of that congested quarter. The company made a number of great improvements in this plant during the year, but its officers are convinced that with their rapidly growing business the matter of an entirely new factory is a question for early consideration.

Heavy tools, with planers predominating, have had a phenomenal run during the last weeks of December; radials have also been good sellers, and heavy duty uprights for special and speedy work have established new records. All jobbing foundries are engaged to their capacity, and a few of the larger will add equipment and help.

Dealers report the customary December-end dullness, but good inquiries and prospects for the opening weeks of the year.

The MacBeth-Evans glass factory in Marion, Ind., will be enlarged by an addition to the machine shops.

Information from Columbus, Ohio, says that the reported shut down of the Buckeye Steel Castings Company because of low gas pressure is untrue. To provide for any such contingency the officials had arranged for a large storage supply of crude oil, and when the gas supply was threatened, this

supply was turned on and the gas off. Nearly all the large manufacturing establishments in the Ohio and Indiana gas belt provide for any similar emergencies by keeping constantly in storage a bountiful supply of crude oil, which makes excellent fuel.

The East Side Improvement Association of Toledo, Ohio, named P. J. Dolan, R. H. Finch and A. J. Eggleston a committee to inquire into plans looking to the removal to Toledo of the independent implement manufacturing plant now at Bellevue, Ohio.

H. M. Spence, W. S. Smith, Albert Kootz, W. C. Baker and D. C. Castro, all of Parkersburg, W. Va., have incorporated the Spence, Smith & Kootz Company, for the manufacture of machinery. The capital stock is \$50,000.

The American Valve & Meter Company, Cincinnati, has been incorporated by Wallace M. Gray, Dwight S. Marfield, Harry G. Poundsford, C. A. Culbertson, V. T. Price and Anthony Eisen. This is the concern which was recently taken over by operatives headed by Mr. Marfield, who is the attorney in the matter and identified also in a stock way with the organization. The capital stock is \$230,000. The company will add to its line the manufacture of railroad equipment in the nature of water storage supply for engines, such as tanks, &c.

### Cleveland Machinery Market.

CLEVELAND, OHIO, January 4, 1910.

Local machinery houses and machine tool builders regard the outlook for 1910 as very bright. Taken altogether the past year has been a satisfactory one. The first six months' business was rather light, but for the last half of the year it has been very good, and some dealers report that they have done as much during that period as in any previous six months, and perhaps more. During the past week some good orders have been placed by makers of automobiles and automobile parts, but as usual the holiday season's business has been rather quiet and practically confined to single tool requisitions. For the past six months the market has gradually broadened, and buying, which in the summer was limited largely to the automobile trade, has become quite general. With steadily improving business manufacturers in metal working lines have been adding to their equipment, and with the bright outlook for this year many plant extensions are being planned, for which machinery equipment will be needed. Orders from railroads for the last half of the year did not come in as rapidly as expected, but it is believed that the demand from this source will improve materially early this year. Inquiries for heavy handling and other machinery have steadily increased and a large amount of work which has been held up until after the first of the year is in sight.

An important development in the machinery market is the fact that many of the large automobile companies are already placing orders for machinery requirements for their 1911 output. Last year some of these companies made their machine tool purchases in the spring, but the bulk of their buying was in August and September. Some of the companies have already placed orders for considerable machinery deliveries in June and later; others have inquiries out, and are expected to come in the market during the next few weeks. The haste shown by the automobile trade to buy for its next season's requirements is attributed partly to the advancing prices, but more to the delayed deliveries, particularly on milling machines and automatics, on which some of the leading makers can not now promise shipment before the middle of next summer, and in some cases later.

The Cleveland Tool Steel Company, now located on West Third street, has purchased a building site on East Eighty-second street and expects to begin the erection of a new plant in the spring, that will enable it to largely increase its present capacity, which, because of the growth of its business has become entirely too small. Plans for the plant have not yet been completed, but a one-story building will probably be erected, providing about 15,000 ft. of floor space.

The Timken Roller Bearing Company, Canton, Ohio, surprised its employees at Christmas time by presenting them with cash gifts amounting to nearly \$5000. To each employee, who had been with the Canton plant a year or over, a full week's pay was added to the regular salary. To each person who had been in the company's employ a half year or over one-half week's salary was given.

The Henry & Scheible Company, Cleveland, furnace builder, has purchased the Ferro Steel Register plant in Chagrin Falls, Ohio, and will fit it up for foundry purposes. Some additional foundry equipment will be purchased.

The Canton Drop Forging Company, Canton, Ohio, which has increased its capacity considerably during the past year, will further enlarge its plant by the erection of an addition to be used as a machine shop. The capacity of its die department will be doubled.

The Park Drop Forge Company, Cleveland, has been

gradually increasing the capacity of its plant during the past year, so that its present output is three times that of a year ago. This company now has 19 steam and board hammers in operation and has ordered one more hammer which has not yet been delivered. The company has reached the limit of its present building capacity and may decide to build an extension to its plant in the spring. It reports that it has all the work that it can do.

The Wellman-Seaver-Morgan Company, Cleveland, has received an order for a 10-ton Hulett ore unloader for the new blast furnace of Corrigan, McKinley & Co., in Cleveland. This is in addition to two Hulett unloaders previously ordered for this plant which were erected during the past year. In addition to having its shops well filled with work at the present time the Wellman-Seaver-Morgan Company is figuring on inquiries for a large amount of work in coal and ore handling machinery as well as in its other lines, and its outlook for a very busy year could not be more promising.

The Northway Motor & Mfg. Company, Detroit, Mich., maker of automobile motors and transmissions, is planning extensions to its plant and has been a heavy buyer of machine tools during the past two weeks.

The Coe Mfg. Company, Painesville, Ohio, maker of veneer machinery, has been taken out of the hands of receivers in which it was placed last August, and reorganized with the following officers: R. C. Moodey, president; F. H. Murphy, vice-president; George P. Steele, treasurer; L. J. Cameron, secretary, and Harry P. Coe, general sales agent.

### Milwaukee Machinery Market.

MILWAUKEE, WIS., January 4, 1910.

Everywhere through the Central West and Northwest there is observable a trend towards the building of industrial machinery for much larger capacities than have heretofore been demanded; hence, in the various shops and foundries supplying this trade, heavier equipment must be provided. To meet the requirements of the situation, some purchases of larger cranes, hoists, tools, &c., have already been made; but these are only a beginning, and the new calendar year will witness great activity along that line. Need of additional boilers, engines, generators, motors, pumps, air compressors and power transmission machinery is also generally felt and it will soon be impracticable for manufacturers of such apparatus to take any contracts for prompt delivery. Some large orders are now being placed for as much as 10 to 12 months ahead.

The beginning of the new year finds trade here upon a generally substantial basis, and, in the judgment of leading manufacturers, every indication points to an era of prosperity such as the plants hereabouts have not known in any period of their history. This applies to every line of the metal working industries.

During the twelve months past there has been extraordinary activity in building extensions to Wisconsin shops and foundries, as well as in the erection of entirely new plants. Plans for the gradual re-equipment of existing works throughout the State have also been made which will involve an expenditure reaching into the millions and extending over a considerable period of time. For manufacturers of shop, foundry and general industrial machinery that is, by far, the most important fact. A much larger proportion of this equipment than in past years will be purchased from machine tool builders and others in this section for the reason that the apparatus locally produced is coming to be recognized at home, as well as elsewhere, as equal to the best. Formerly it was sold almost entirely in other States.

In this connection it should be observed that users of Wisconsin-built machinery, including shop tools, who have been attracted by announcements of improvements in competing designs, will do well to make further inquiries here before placing any orders elsewhere, as manufacturers throughout the State were very generally occupied, during the long period of dullness, in perfecting various details of their specialties. Even where no radical departure in practice has been made, a multitude of minor alterations and adjustments has materially increased the efficiency of almost all standard machines; and the working range of many of these tools may be widened by means of special attachments recently brought out.

A serious loss was sustained here on December 31, by the burning of the Milwaukee Trade School, which, although established only a short time ago, has come to exercise an important function in the industrial life of the community, being now supported by the city. How well its students are trained is shown by the fact that some manufacturers hire them as qualified machinists long before they have completed their course. Such a condition is, of course, undesirable, but it speaks well for the school. Temporary quarters will be secured and the work continued with as little interruption as possible. For the new and model building which is now likely to be erected at once, a large line

of equipment must be provided. Machinery manufacturers who are willing to sell to the school at cost, with possibly some donation, will find it a good advertisement, as visitors are numerous and represent many of the leading industries of the country. They not only examine the work of the students very closely; but also inspect the machines upon which it is made and observe how they are handled.

The Racine-Sattley Company, Racine, Wis., is reliably reported to have decided upon undertaking the manufacture of automobiles. No details as to plant equipment have yet, however, been given out.

The Power & Mining Machinery Company, Cudahy, Wis., is working on an order from the Schuylkill Stone Company, Birdsboro, Pa., for a jaw crusher having dimensions 60 x 84 in., which is said to be the largest machine of the kind ever constructed.

The LaCrosse Water Power Company, La Crosse, Wis., will undertake further hydro-electric developments in the vicinity, and work is to be started at once on another large dam. This will ultimately involve the purchase of considerable new machinery.

Installation of a gas producer and gas engine is under consideration for the new factory of the Bradley Knitting Company, Delavan, Wis., which was mentioned in this report some weeks ago.

The Fred M. Prescott Steam Pump Company, West Allis, Wis., has opened a district sales office at Salt Lake City, from which the company's business in the mountain States will be cared for. R. E. Burke, an experienced pumping machinery salesman, familiar with the needs of the mining districts, will be manager of this branch.

Geo. B. Foster, who for the past ten years has been manager in Chicago, successively, for the Wagner Electric Mfg. Company, Allis-Chalmers Company, and the Power Improvement Company, was recently elected secretary-treasurer of the Corliss Motor Company, Corliss, Wis., and will take charge of the building and equipment of the extensive plant to be erected there.

The American Machine Company has been organized at Eau Claire, Wis., and will establish a plant for the manufacture of special machinery. Equipment details have not yet been fully determined upon.

The Stevens Mfg. Company, Marinette, Wis., which is a reorganization of the A. W. Stevens Mfg. Company, will continue the manufacture of farm implements, including field tools, in the same plant. Additional equipment will be needed.

Prof. Daniel W. Mead, Madison, Wis., is consulting engineer in charge of plans for improving the water works system at Quincy, Ill., where a high duty pumping engine of 6,000,000 to 8,000,000 gal. daily capacity will probably be purchased this month.

Power apparatus and machinery for box making will be required by J. S. Crisler, Rice Lake, Wis., for a new factory.

O. W. Mosher, New Richmond, Wis., has had plans prepared for a power plant of 600 kw. hydraulic turbines operating under a low, variable head will be installed and direct coupled to electric dynamos.

The Wisconsin Handle Company, Sturgeon Bay, Wis., will establish a factory in what has been known as the Pankratz mill. Most of the machinery required is understood to have been already secured, but more will be needed later.

The Progressive Foundry & Mfg. Company has been incorporated as successor to the foundry business of Geb & Kosterman, Racine, Wis., and will do a general jobbing trade. Some extension of the plant and increase of equipment will be rendered necessary shortly by the volume of profitable orders obtainable, particularly from motor-vehicle manufacturers.

The Weyher Machine Company, Whitewater, Wis., has started to build auto-trucks. A new or considerably enlarged plant may be built before the end of the present year.

Douglas Meyer, Plymouth, Wis., will soon have plans in readiness for the erection of a factory with power plant attached.

A machine shop 40 x 100 ft. will be built in Milwaukee by Chas. D. Rogers, but the name of the occupant has not been stated.

K. Jacobson & Co., Racine, Wis., are installing a new power plant, including boiler and engine, for operating their factory.

The Bucyrus Company, South Milwaukee, has taken an order from Rangoon, Burma, for an 8½ ft. placer dredge to be installed by the Mewaing Gold No. 1 (Company) Ltd. operating in that vicinity, also one 8½ ft. and one 13½ ft. dredge for the Natomas Construction Company, and one 8½ ft. machine for the Yuba Construction Company, Marysville, Cal.

The Racine Foundry Company, recently incorporated at Racine, Wis., by H. E. Graham, and others, will produce castings especially for the automobile trade in iron, brass and aluminum. At new foundry 60 x 125 ft., boiler shop 30 x 100 ft., and machine shop 40 x 100 ft. will be erected. Pending their completion two local plants already built will be utilized. An extensive line of new equipment is being ordered.

## Chicago Machinery Market.

CHICAGO, ILLS., January 4, 1910.

The machinery houses of Chicago have closed a very satisfactory year and there is a general feeling of confidence that 1910 will break all records in machine tools and all classes of machinery and machine shop equipment. The year 1909 opened under very discouraging conditions. December had proved perhaps the most disappointing month of 1908, but January and the early months of 1909 were but little better. All the rest of the world was prosperous, while the machinery men contemplated stocks in their houses which had been purchased at 1907 prices and remained unsold. The railroads disappointed all expectations for many weary months, and manufacturers throughout the West were slow to resume plans for improvements which had been under way or under consideration when the panic came.

In May there was a genuine improvement and sales reached a very satisfactory figure. The prices obtained showed little or no profit, but the change was encouraging after the stagnation that had prevailed for a year and a half. The trade up to that time had been of a fitful character, active for a few days and then relapsing for a week or two weeks, and showing no breadth or depth. The revival in May seemed like the beginning of a strong market, but further disappointment was in store, as June brought a reaction.

During the last half of the year, however, machine tool buyers made amends honorable for their long period of indifference. The automobile manufacturers came into the market during the early summer months with liberal orders, which for a time did not attract much attention. The movement continued to gain in breadth until it became the feature of the market. One automobile manufacturer purchased 138 lathes and 60 milling machines in one contract, and during July, August, September and October this business, with a general growth in the demand from other sources, gave many of the machinery houses the most satisfactory run of trade they had ever known. The leading manufacturers of milling machines booked orders for all the machines they can deliver through half of 1910. The stocks of lathes, shapers, planers and other standard machine tools, which many of the factories had accumulated during their long dull period, were gradually cleared out and at the close of the year buyers found it necessary to wait several months for deliveries of boring mills and many sizes of lathes. Prices have gradually stiffened until they show a better margin of profit. Bare spots have appeared on the floors of leading Chicago houses, where machines shipped out cannot be replaced for a time by shipments from the factories. While sales slowed down during November and December, inquiries in hand and the general feeling in the trade indicate a period of activity in the early months of the new year.

## Miscellaneous Machinery and Power Equipment.

The Dunkirk Power & Heating Company, H. T. Litchfield, vice-president and secretary, Dunkirk, N. Y., is constructing a large addition to its power plant, in which will be installed three-phase alternating current apparatus in units aggregating several thousand horsepower.

The power equipment for the new factory which the Utica Fine Yarn Company is erecting at Utica, N. Y., will be furnished by the Allis-Chalmers Company, Milwaukee.

The Otis Elevator Company, Buffalo, has completed plans and will at once receive bids for a machine shop, 300 x 300 ft., structural steel and brick construction, which it will add to its plant at Grider street and the New York Central Railroad Belt Line. Considerable new machinery will be required for its equipment. A large foundry building is also to be added to the plant a little later.

The erection of the new machine shop of the Snow Steam Pump, Works, Buffalo, will involve an expenditure of \$100,000, including the increased machine tool equipment required.

The Russell Wheel & Foundry Company, Detroit, will erect the iron and steel work of a four-story factory, 86 x 362 ft., to be built by the Briggs Mfg. Company at Lenschner avenue and the Grand Trunk Railway, Detroit.

Hupp, James & Halloran, Detroit, have let contract for a foundry building, 100 x 120 ft., at Lycaste and Jefferson avenues.

The plant of the Union Radiator Company, Johnstown, Pa., is to be enlarged and additional power equipment installed.

The Guanajuato Power & Electric Company, Colorado Springs, Colo., has increased its capital stock from \$3,500,000 to \$5,000,000. The increased capitalization will be used for improvements and to secure control of various electric

power and lighting companies in Mexico, as well as to increase the already extensive operations of the company in Guanajuato. The company's system now covers an area of more than 11,000 square miles, including rich mining and agricultural land, and the increased power will be utilized largely for manufacturing purposes and to operate pumps in irrigation sections.

The proposition to bond the city of Chillicothe, Mo., for \$50,000 to build an electric light plant was carried by a large majority at the election recently held for that purpose.

The Colorado Railway, Light & Power Company, Denver, Colo., has been incorporated with a capital of \$5,000,000 to take over the property of the Southern Colorado Power & Railway Company, Trinidad, Colo., which is in the hands of a receiver. The new company will increase the capacity of the plant from 1500 to 15,000 hp., and expects eventually to supply light and power for all the district near Trinidad. The old company's plant was destroyed by fire last June and subsequently went into receivership.

The Cleveland Machine Company, Marion, Ind., incorporated with a capital stock of \$25,000, will commence to work out its plans for a plant to be built in the spring. Machinery for manufacturing glassware of all kinds is to be produced by the company.

The Whatcom County Railway & Light Company, Bellingham, Wash., will soon commence the construction of an auxiliary power station to relieve its power plant at Nooksack Falls during the winter months. The new station is to be completed by next August, and the total cost, including the machinery, will be approximately \$274,000. When completed the plant will have a capacity of 4500 hp. Sufficient machinery will be installed to generate 3000 hp. in addition to the equipment of the present auxiliary plant which has a capacity of 1500 hp. A 2000-kw. steam turbine will be installed in the plant when completed, besides the boilers, which will have a combined capacity of 1000 hp. It is understood that orders for this equipment have not been placed as yet.

The Municipal Light & Power Company, Pendleton, Ind., incorporated with an authorized capital stock of \$25,000, for the purpose of establishing an electric light and power plant at Pendleton, will commence work upon the plant as soon as contracts can be let. Bond has been given by the company for the completion of the plant by July 1. Power will be supplied to manufacturing plants and later on it is the intention of the company to establish an ice plant. The president of the company is Ira Holmes, Indianapolis; vice-president, J. P. Taylor, Pendleton; secretary, Will A. Holmes, Indianapolis; treasurer, J. B. Parson, Pendleton.

Two boilers for the power plant of the South Side Interior Finish Company, Chicago, will be bought in the near future.

The erection of a municipal power and pumping station is proposed at Paintsville, Ky.

The Mayo River Power & Land Company, Denver, Colo., whose power concessions on the Mayo River in Mexico were recently mentioned in *The Iron Age*, will begin the erection of a hydro-electric plant in the spring. The location is near San Bernardino in the Alamos district of Sonora. From it electric power will be supplied to various mines and ore reduction plants, and the plan is to install additional generating units as the consumption of current increases.

A small pumping unit for community service will be installed in 60 or 90 days at George, Iowa.

The Evansville Gas & Electric Company, Evansville, Ind., is contemplating the purchase of a steam turbine generating set with which to increase the capacity of the station.

Preliminary plans for the construction of water works have been taken under advisement by the municipal officials at Georgetown, Ill. The details have not yet been worked out.

A. F. Wuensch, Albuquerque, N. M., will install a hoist and an air compressor, the order for which was recently placed. More equipment for mine development is to be bought in the spring.

Improvements will be made to the pumping plant at Sandusky, Ohio, which is operated by the city.

A centrifugal pump, electrically operated, is to be installed in the spring at Monmouth, Ill., where the city of officials are now working out plans for improving the water supply.

The power plant and manufacturing facilities of the Harris Mfg. Company, Johnson City, Tenn., are being enlarged. Three new boilers will furnish steam for the engines and factory.

The building of a municipal pumping station is proposed at Eureka, Cal., and plans will probably be matured at an early date.

Hydraulic turbines and generators having an aggregate capacity of 6000 to 7000 kw., will be installed in a power plant to be erected by the Hickory Water Power Electric Company, Hickory, N. Y., the units of equipment to be provided one at a time as contracts for current warrant.

New machinery is to be purchased by Radcliffe Bros., Shelton, Conn., for the plant about to be erected and remodeled which will replace one damaged by an explosion.

The first complete installation of electric motor drive in

any saw mill on the Pacific Coast will be made by the Union Lumber Company at Lacey, Wash. Power will be furnished by a steam turbine of 1000 hp. driving an alternating current generator.

The Camden Electric Light Company, Camden, Tenn., will take bids in the near future on a generating unit and other new machinery for its power plant.

The Meishon-Bacon Company, Bay City, Mich., will install a 300 hp. generator, exciter and control apparatus for a complete power unit.

At Notehead City, N. C., the municipality is planning construction of water works and a sewerage system, for which pumping machinery will be needed.

A high duty, triple expansion pumping engine of large capacity may be purchased this year by the Sterling Water Company, Sterling, Ill. One capable of delivering 30,000,000 gal. daily has been recommended.

The Ferrofix Brazing & Machine Works, Seattle, Wash., is utilizing an oxy-acetylene welding outfit for repairing automobile parts and marine machinery.

The Ezell Mfg. & Plating Company has been organized at Los Angeles, Cal., by B. V. Ezell. Its product will be metal specialties. Hereafter all plants erected in Los Angeles must be within nine distinct districts laid out by the city for industrial purposes.

The pumping plant and water works system of Martinsburg, W. Va., will be enlarged, bonds having recently been authorized for the purpose. No machinery requirements have as yet been made public.

The power generating station of the New Milford Electric Light Company, New Milford, Conn., will be increased in capacity by the addition of a turbine unit.

The authorities at Carroll, Neb., will decide some time this month on the purchase of machinery for the water works recently approved.

A McCully breaker, with 3½ ft. opening, which is among the largest ever constructed, will be installed by the Chicago Portland Cement Company, Oglesby, Ill.

Additional boilers will probably be purchased in the near future, together with a new steam power unit, for the municipal lighting station at Media, Pa.

Construction of a new hydro-electric plant is planned by the Bangor Railway & Electric Company, Bangor, Maine, which will start work shortly on a concrete dam.

A hydro-electric power plant will be built in the near future by the Utah Gold & Copper Mines Company, Fremont, Utah.

One or more turbine units will probably be added this year to the power generating equipment of the Washington County Light & Power Company, Stillwater, Minn., which will largely extend its system for commercial load.

A new factory is to be built at Youngstown, Ohio, by the Reinforced Tile Roofing Company. Machinery requirements have not been fully determined upon.

Pumping equipment driven by gasoline engines or electric motors will probably be bought this year for municipal service at De Kalb, Ill.

The Thistedown Mining & Milling Company, Ouray, Colo., will install a new ore reduction plant, including power and electrical machinery.

A centrifugal pump or pumping engine may be added this year to the municipal water works at Iowa City, Iowa.

The Roanoke Electric Light & Power Company, whose extensive hydro-electric project was recently referred to, has elected as secretary and treasurer I. T. Stoneburner, Edinburg, Va., to whom inquiries concerning machinery requirements can be addressed. No detailed plans, however, have yet been drawn.

Terry Bros. & Smith, Silverton, Colo., will add to their crushing plant, which is electrically operated.

The Cates Machine & Bridge Company, Burlington, N. C., recently organized, will provide a plant with equipment for fabricating bridge, culvert and other structural parts.

C. T. Holmes, Farmington, N. H., who recently acquired the John R. Hayes plant, will enlarge and improve its output.

An electric power plant for municipal service is to be built this year at Hill City, Kan.

The Keating Mining Company, Radersburg, Mont., will install in the near future electrically operated hoists and compressors to replace the steam driven equipment now in use. C. W. Pritchett, Denver, Colo., is consulting engineer.

The Messalonskee Electric Company, Waterville, Maine, is preparing to construct a new hydro-electric plant, in which impulse turbine wheels will be installed.

The Bruce & Bivens plant at Pickens, S. C., which was destroyed by fire will soon be replaced with a modern electrically operated mill.

Machinery will be required shortly for the pumping plant to be erected by the Glendale Water Company, recently organized at Glendale, W. Va.

A pump house and water supply system will be constructed this winter by the Allen Water Company, recently organized at Allen, Texas.

The Detroit Steel & Spring Works, Detroit, Mich., recently mentioned, will take bids shortly on the buildings and equipment of a large manufacturing plant.

New machinery is required by W. H. Clem, Helena, Ark., for a planing mill to replace the structure which burned last fall.

Construction of water works, with motor driven pumps, is under consideration by the authorities at Yacoit, Wash.

The National Electric Shoe Company, Colchester, Conn., which is preparing to increase its manufacturing facilities, will install a power unit for lighting the factory as auxiliary to the equipment in service.

The Belknap Company, Richfield, Utah, recently mentioned, is proceeding with plans for its new power plant. Specifications covering the machinery will be obtainable in the near future.

In addition to the equipment recently mentioned the Rockport Drain Tile Company, Rockport, Ind., will require some power machinery.

Plans for a municipal power plant and pumping station electrically operated, are being considered by the council at Sterling, Neb. Action will be taken shortly.

The Cleveland Cliffs Iron Company will install a number of power and lighting transformers along its power transmission lines in the vicinity of Gwinn, Mich.

The Thornapple Gas & Electric Company, Hastings, Minn., is reported to have decided upon the purchase of additional power machinery.

Thos. Madden & Sons, Indianapolis, Ind., are proceeding with an addition to their factory for which some new equipment will be needed.

A large line of induction motors for driving constant speed tools will be added to the manufacturing machinery of the Rapid Motor Vehicle Company, Pontiac, Mich.

The city of Waterloo, Ont., is having plans and specifications drawn for a new electric power station. One or more turbine units will be installed.

Machinery is required by the Sierra Nevada Lumber Company for a new sizing plant at Salt Lake City, Utah.

The municipality of Bradford, Ohio, is reported to be in the market for new water works equipment, including both steam and gas engine driven pumps of moderate capacity.

Plans for an electric power station to be operated by the municipality are being formulated at Prince Rupert, B. C., the terminal of the new Grand Trunk Pacific Railway.

Two large Corliss engines are to be added to the power equipment of the packing houses operated by Morris & Co., Chicago. Location not specified. Considerable electrical apparatus will also be purchased during the year.

Fire pumps are to be bought before long at Scandia, Kan., where the installation of a water supply system is being planned.

A plant for fabricating light metal ornamental work is under construction by R. H. Duncan, Dubuque, Iowa. The initial equipment has been purchased.

New crushing machinery, screens, &c., which have already been ordered, will be installed by the Portage Silica Company, Youngstown, Ohio. Additional apparatus will be needed shortly.

The Clinton Gas, Light & Coke Company, Clinton, Iowa, contemplates adding 2000 hp. to the capacity of its power plant. Definite plans have not yet been drawn.

The construction of extensive water works, including pumping station, is under consideration at Huron, S. D.

Two vertical triplex pumps, with electric motors to operate them, will be bought for the water works now under construction at Detroit, Minn.

The Auto-Axle Company, Fort Wayne, Ind., is installing a plant for the manufacture of drop forgings and other axle parts.

The Western Gypsum Company, Salt Lake City, Utah, will buy a 50 hp. gas engine, crusher, &c., for a 500-ton plant near Lovelock, Nev.

Moline, Ill., will probably take bids shortly on boilers of 400 hp. capacity, with engine and centrifugal pump for a filtration plant.

The Northwestern Metals Company, Helena, Mont., whose organization was chronicled some time ago, has decided upon the erection of a 100-ton smelter in the spring as one unit of a large system to be constructed later.

The building of an electric lighting plant is under consideration at Gypsum, Kan.

The Hydro-Electric & Gas Company, Warren, Ohio, contemplates erection of an auxiliary plant for extending its power system to neighboring towns and increasing the commercial day load.

A small pumping plant for water supply will be built by the town of Lyndon, Wash.

Machinery is shortly to be purchased for the electric power and pumping station decided upon by the city of Murray, Utah.

C. F. Knoll, Bunkie, La., is in the market for boiler, engine, generator and other apparatus.

The Snead Power Building Company, Louisville, Ky., whose plans were recently referred to in *The Iron Age*, will take bids on boilers, engine or steam turbine, generator, heater, condenser, switchboard, &c.

The Lone Star Mill Company, McKinney, Texas, will

build a power plant. Gas producer and gas engine are favored, together with electric generator; but a steam turbine unit may be installed. Electric motor drive is planned.

Construction of a new pumping unit is under consideration at Riverside, Ill.

The Omaha (Neb.) Street Railway Company, whose plans for improvements were recently forecasted, will install steam turbines in its generating station. The type now in service in the city is likely to be favored.

Power and pressure machinery, drying cylinders, &c., will be required by the Sacramento Sandstone Brick Company, Sacramento, Cal., for a new plant.

Plans for a machine shop at Eveleth, Minn., are being put into execution by the Adams Mine Stripping Company. During the present year this concern will purchase some new and some used equipment for completing installations.

Contracts are to be let shortly for pumps and other equipment for municipal water works at California, Mo.

Some new apparatus will be required by the Pennsylvania Railroad Company for reconstructing a pumping plant that burned at Dubois, Pa.

An extension of its plant for the manufacture of auto-trucks having been decided upon by the Sayers & Scoville Company, Brighton, Ohio, some new tools, as well as power equipment, will be required. Plans have not yet, however, been fully matured.

The capacity of the municipal station at Statesboro, Ga., is to be enlarged. Bids will be taken about March 1, on a Corliss engine, generator, switchboard panels and auxiliary apparatus.

The Oliver Iron Mining Company is reliably reported to have decided upon the installation of an electric power plant at Marble, Minn., for lighting the district.

A Corliss engine, electric dynamo, motor and centrifugal pump are required for the water works at Sioux Falls, S. D.

The Lincoln Traction Company, Lincoln, Neb., has decided upon installation of a steam turbine and alternating current generator, with auxiliary apparatus, increasing its power capacity 500 kw.

Plans are being prepared for a pumping station and electric power plant at Canton, Kan.

The Kokomo Motorcycle Company, recently organized at Kokomo, Ind., is preparing to build a factory.

The Lake Superior & Nevada Development Company, De Beque, Colo., will require machinery shortly for drilling and shaft driving on property recently acquired.

The Worth Automobile Company, Kankakee, Ill., is remodeling a nail factory, which will be converted into a plant for the manufacture of motor vehicles.

The authorities at Alameda, Cal., are considering installation of another electric generating unit in the municipal power plant.

The Converse Bridge Company, Chattanooga, Tenn., is preparing to enlarge its plant by fall. Meanwhile some additional shop room will be made by shifting and improving the equipment.

The Flaketown Graphite Company, Mountain Creek, Ala., will install a large direct current motor and other operating machinery.

The Mt. Carmel Gas & Electric Company, Mt. Carmel, Ill., is building an addition 50 x 80 ft., in which new power equipment will be installed.

A large gyratory crusher will be added to the plant of the Aetna Sand & Gravel Company, Algonquin, Ill.

A hydro-electric power development of 2000 hp., requiring turbines, dynamos, governors and pressure regulators, is to be undertaken by W. O. Fisk, Hamilton, Mont., in the vicinity of that place.

The Globe-Taunton Nail Company, Taunton, Mass., will erect a new factory, equipping it with automatic machinery, power apparatus, &c.

Work is progressing rapidly on the new plant of the Security Cement Company, which has been located at Hagerstown, Md. For the power house an alternating current generator unit of 750 kw. will be provided.

The Citico Furnace Company, Citico, Ala., has decided upon a gyratory breaker for crushing flux stone, preference to be given the Austin type.

The McLanahan-Stone Machine Company, Hollidaysburg, Pa., is putting on the market machinery for jigging red Alabama hematite ores.

Another hydro-electric plant of large capacity will be built by the Otis Company, Three Rivers, Mass.

D. B. Getty, Cedar Rapids, Iowa, has organized the Universal Crusher Company, with \$50,000 capital, to manufacture an improved type of rock breaker.

Lathes and other woodworking machinery, with power apparatus, motors, &c., will be required by the Muncie Chair Company, recently incorporated at Muncie, Ind., for a new factory.

The Dixie Culvert & Metal Company, composed of Middletown, Ohio, parties, will establish a fabricating plant in Baton Rouge, La.

Saw mill machinery, with power equipment, will be required for a new mill by Victory Bros., West Branch, Mich.

Additional pumps for water works service will probably

be purchased in the near future by the municipality at Charleston, Miss.

The authorities at Millvale, Pa., have had plans prepared for the new power plant to be operated by the city, including steel stack, boilers, heater, Corliss engine, alternating current generator, exciter and switchboard.

Plans for water works at Leon, Iowa, have so far matured that purchase of pumping machinery will be made in the spring.

An hydraulic turbine of 5000 hp., with generator for alternating current direct coupled, will be installed about June 1, by the Portland, Ore., Railway, Light & Power Company, in a new plant.

The Northwestern Iron Company, Milwaukee, will make some improvements this year in the various properties under its control.

The authorities at Pella, Iowa, whose plans for water works have already been mentioned, will enter into contracts for machinery in about two months.

An addition, with motor driven tools, will be made to the factory of the David Gilmour Door Company, Buffalo, N. Y.

Some new operating equipment, including machine tools, will be required within the next few months by the Remington Machine Company, Wilmington, Del. Many contracts are now being taken in the South.

Walter and George H. Leight of Beaumont, Texas, have formed the Neches Motor Car Company.

Power plant equipment, including 250 hp. fire tube boiler, engine, generator, motors, control apparatus, &c., will be purchased early in the coming year by the Midland Water, Light & Ice Company, Dodge City, Kan.

Water works are likely to be built this winter at Orlando, Okla.

A crushing machine of the Huntington type will be installed in the near future by the Comanche Gold Mining & Milling Company, Comanche, Tex.

The North Jersey Construction Company has placed an order for Bullock electrical apparatus as follows: Two 300 kw. rotary converters, 13,200/650 volts, and six 110 k.v.a. step-down transformers of the oil-filled, water-cooled type, with six-panel switchboard.

Additional pumping equipment will probably be purchased within the next few months for the municipal water works at Beatrice, Neb.

## Government Purchases.

WASHINGTON, January 4, 1910.

The Bureau of Supplies and Accounts, Navy Department, Washington, opened the following bids December 28:

Class 1, one planer, matcher and molder—Bidder 4, James S. Barron & Co., New York, \$790.22, \$933, \$1233, \$1200 and \$1633; 43, Charles S. Este Company, Philadelphia, Pa., \$541; 49, J. A. Fay & Egan Company, Cincinnati, Ohio, \$364, \$512.50, \$787, \$1213, \$1357.50; 68, Henshaw, Bulkley & Co., San Francisco, Cal., \$422; 69, Harron, Ricard & McCone, San Francisco, Cal., \$358; 114, Oliver Machinery Company, Grand Rapids, Mich., \$384; 167, A. S. Young Machinery Company, San Francisco, Cal., \$812 and \$733; 172, Drew Machinery Agency, Manchester, N. H., \$835 and \$1025.

Class 2, one power combination saw—Bidder 4, James S. Barron & Co., New York, \$235 and \$408; 22, R. W. Geldart, New York, \$365, \$465 and \$515; 49, J. A. Fay & Egan Company, Cincinnati, Ohio, \$253.50 and \$184.50; 55, Fox Machine Company, Grand Rapids, Mich., \$475; 68, Henshaw, Bulkley & Co., San Francisco, Cal., \$242; 69, Harron, Ricard & McCone, San Francisco, Cal., \$250, \$347 and \$161; 114, Oliver Machinery Company, Grand Rapids, Mich., \$386 and \$411; 167, A. S. Young Machinery Company, San Francisco, Cal., \$267 and \$257.50; 172, Drew Machinery Agency, Manchester, N. H., \$320, \$390 and \$465.

Class 11, one screw cutting extension gap lathe—Bidder 69, Harron, Ricard & McCone, San Francisco, Cal., \$792; 100, Manning, Maxwell & Moore, New York, \$925.

Class 61, five 2 kw. generators—Bidder 103, Marconi Wireless Telegraph Company, New York, \$2250; 110, National Electric Signaling Company, Pittsburgh, Pa., \$3750 and \$4890.

## Trade Publications.

**Electric Motors and Generators.**—Crocker-Wheeler Company, Amperé, N. J. Bulletin No. 118, superseding No. 98, illustrates and describes form L direct current motors in sizes ranging from  $\frac{1}{2}$  to 70 hp. and generators having a capacity of from 0.6 to 3.5 kw. for situations requiring a small amount of power. There are a number of illustrations showing these machines in actual use for a great variety of purposes. A table of dimensions of the sizes, together with a list showing the current required by each machine, is included.

**Carborundum.**—The Carborundum Company, Niagara Falls, N. Y. Booklet. One of the series of humorous biographies combining fact and fiction entitled "The Revised American

Statesman Series," written by the president of the company, F. W. Haskell. The subject of this sketch is Benjamin Franklin.

**Steam Regenerators.**—Rateau Steam Regenerator Company, 2 Rector street, New York City. Pamphlet. Describes the Rateau steam regenerator and its use in connection with mixed flow steam turbines and a combination of reciprocating engines and low pressure turbines. Various parts of the regenerator and plants where it has been installed are illustrated and described. There is a brief historical introduction and a list of plants which are using regenerators is given at the end. A description of the regenerator appeared in *The Iron Age*, June 2, 1904, and two notable installations were subsequently described. The installation at the South Chicago plant of the International Harvester Company, which was the first in America, was described in *The Iron Age*, July 10, 1906, and March 14, 1907, and an illustrated description of the regenerator installed at the Vandergrift plant of the American Sheet & Tin Plate Company appeared in the issue of January 7, 1909.

**Feed Water Filtration.**—James Beggs & Co., 109 Liberty street, New York City. Booklet, 6 x 9 in., 32 pages, entitled "Feed Water Filtration." This booklet explains how oil, dirt and other impurities get into feed water, the damage they do to boilers, and how to remove the foreign substances. It also tells how the water of condensation and returns from the heating mains may be used to reduce the coal and water bills, and describes the Blackburn-Smith feed water filter and grease extractor in detail. Numerous illustrations of these filters in actual use are included.

**Railroad Location.**—J. B. Taylor & Co., Inc., 30 Church street, New York City. Pamphlet. Gives a concise description of the methods pursued in locating a new line of railroad from the reconnoisance to the location of the line, together with a brief statement of manner of financing enterprises of this sort.

**Oil Engines.**—De La Vergne Machine Company, Locust avenue and East 138th street, New York City. Catalogue, 84 pages. Illustrates and describes two types of horizontal four-cycle oil engines and two vertical two-cycle models. There are numerous illustrations showing these engines driving generators for furnishing current for lighting private residences, small towns and fortifications, supplying current to a number of lighthouses and wireless telegraph stations, pumping water and oil, operating refrigerating machines and air compressors, and general power plant work. An illustrated description of the two vertical engines appeared in *The Iron Age*, September 26, 1907.

**Gas Engine.**—James W. Tygard, South Twenty-sixth and Sarah streets, Pittsburgh, Pa. Pamphlet. Describes a new type of gas engine for aeronautical, automobile, marine and stationary use. In construction this engine is radically different from any now on the market; the cylinder is the moving element and the piston is stationary.

**Automobiles.**—Stevens-Duryea Company, Chicopee Falls, Mass. Bound specification. Gives complete details of the Stevens-Duryea motor cars as regards construction, sizes, equipment and finish. Drawings showing the principal dimensions of the different models are also included.

**Roofing.**—H. W. Johns-Manville Company, 100 William street, New York City. Pamphlet. Pertains to the Regal roofing and roof coating for barns, ice houses, poultry houses and residences having either flat or pitched roofs.

**Pressure and Vacuum Recording Gauges.**—The Bristol Company, Waterbury, Conn. Bulletin No. 114 describes recording gauges for pressure and vacuum and measuring water levels. The complete line of recording gauges made by this firm are practically uniform in size and style, and can be furnished to register in any of the customary units for this work.

**Portable Electrical Tools.**—The United States Electrical Tool Company, 1938-1946 West Eighth street, Cincinnati, Ohio. Catalogue F. Covers a line of portable electric hand, breast, radial and bench drills, portable, bench, surface, center and combination internal and external grinders, all of which are adapted for use on either alternating or direct current lighting circuits.

**Motor-Generator Sets.**—Crocker-Wheeler Company, Ampere, N. J. Bulletin No. 116. Describes the functions of the motor-generator and the methods of choosing the one best adapted to the different uses where it is necessary to change the current supplied by the central station to meet the requirements of special consumers.

**Motor-Driven Laundry Machinery.**—Crocker-Wheeler Company, Ampere, N. J. Bulletin No. 117, entitled "Motor Drive in the Laundry." Shows how electric motor drive has changed the conditions in laundries and brought about an increase in output, effected a saving in repairs and reduced the cost of power consumption. There are numerous illustrations in the bulletin, many of which are of actual installations.

**Foundry Tram Rails.**—J. W. Paxson Company, Philadelphia, Pa. Bulletin No. 20, 6 x 9 in. Illustrates and describes the Moyer tram rail for the foundry, with views of actual installations, together with parts and methods of erecting them. It is stated that by the use of this form of conveying apparatus great savings in the time of handling both molten metal and castings are effected, as well as in the amount of labor required for this work, one man being able to handle a load of 2000 lb. easily.

**Electric Pyrometers.**—Wilson-Maeulen Company, 1 East Forty-second street, New York. Leaflet. Lists different styles of the Advance electric pyrometer and illustrates and describes its use for hardening, tempering, annealing, galvanizing and tinning. One advantage claimed for this instrument is the ease with which it can be applied to one or a large number of furnaces by using a fire rod and a single-throw switch for each furnace. In this way a large plant may be equipped at a small outlay per furnace and as it grows the cost of extending the pyrometer is trifling.

**Steam Turbines.**—Kerr Turbine Company, Wellsville, N. Y., Atwood-Rearick Company, Eastern agents, 30 Church street, New York. Circular. Devoted to the horizontal and vertical models of the Kerr steam turbines. The illustrations show horizontal units directly connected to electric generators, pumps and blowers, and separate vertical and horizontal turbines.

**Cutting and Welding Metals.**—American Oxhydric Company, Milwaukee, Wis. Booklet. Illustrates the cutting and welding of metals by the oxhydric process. One of the illustrations shows a portion of the Pabst Brewery after the explosion of four large boilers on October 25, 1909. An account of this work was given in *The Iron Age* November 11, 1909. Some of these pieces were too large to be handled, and two employees of this firm were sent to cut the steel into short lengths so as to facilitate rapid removal. The American and Canadian patent rights for the manufacture of oxygen and hydrogen by the Garuti system have been acquired by this company, which is in a position to supply apparatus and gases for doing this class of work.

**Calendar.**—Schumacher & Boye, builders of engine lathes, Cincinnati, Ohio, have issued their annual calendar, which is of the same general design as those of previous years. The leaves for each month bear an illustration of one of the line of engine lathes built by this firm, ranging from an 18-in. double back geared standard type to a 48-in. triple geared instantaneous change gear model.

**Calendar.**—Potts & Wittman, dealers in iron and steel and coal and coke, 308 North American Building, Philadelphia, Pa., have brought out a calendar hanger measuring 14 x 16 in. This is more of a utilitarian piece of printing than an ornamental one. The leaves for each month are 7 1/4 x 11 in. and the dates are almost 1/4 in. high, so that they can be readily seen across the room.

**West Virginia Board of Trade Proceedings.**—Pamphlet, 6 x 9 in., 135 pages, containing a complete report of the transactions of the West Virginia Board of Trade at the fifth annual meeting, held at Huntington, W. Va., October 12 and 13, 1909. This pamphlet contains all the addresses and committee reports in full.

**Kerosene Traction Engines.**—M. Rumely Company, La Porte, Ind. Pamphlet entitled "Towing and Tilling the Soil." Describes the Rumely Oil Pull tractor, which uses kerosene as fuel, and is especially designed for pulling mechanical gang plows, although it may be employed with equally good results wherever either traction or belt power is required. There are a number of illustrations of different parts of the engine and a series showing the methods of plowing in various parts of the world.

**Grinding Wheels.**—Vitrified Wheel Company, Westfield, Mass. Catalogue No. 6. This is the company's 1910 grinding wheel catalogue describing and illustrating emery and corundum wheels made by the vitrified process. The process of making these wheels is briefly described in the introduction with the qualities of vitrified emery wheels, vitrified corundum wheels, elastic wheels and silicate wheels. Diagrams of the special and standard shapes in which the wheels are made for different purposes, occupy the following pages. A grade list is given and explained, together with a price-list. Emery wheel dressers in three different styles are illustrated and described and the succeeding pages give diagrams and dimensions of specially shaped wheels for Brown & Sharpe, Landis, Cincinnati, Greenfield, Walker, Gould & Eberhardt, Pratt & Whitney, Diamond and Springfield grinding machines and various makes of twist drill, tool and knife grinders.

**Iron and Steel Reference Book.**—Joseph T. Ryerson & Son, Sixteenth and Rockwell streets, Chicago, Ill. Handbook. Designed to supplement the monthly stock list published by this firm by comprehensively illustrating in convenient form for ready reference their entire line of iron, steel, machinery and numerous specialties. All the different things capable of illustration are shown, and a number of tables are given showing weights, prices and quantities generally carried in stock.

**Molders.**—S. A. Woods Machine Company, Boston, Mass. Booklet. Illustrations and descriptive matter explain the advantages and operation of two of the line of inside molding machines built by this firm. The different parts of the machine are illustrated and the accompanying printed descriptions make it a comparatively simple matter to see just what these machines do and how they do it. The truing device used on both these molders is the same as the one employed on the planers of this firm, an illustrated description of which appeared in *The Iron Age*, November 5, 1908.

# CURRENT METAL PRICES.

The following quotations are for small lots. Wholesale prices at which large lots only can be bought, are given elsewhere in our weekly market report.

## IRON AND STEEL— Bar Iron from store—

Refined Iron:	
1 to 1½ in. round and square.....	per lb. 2.00c
1½ to 4 in. x ½ to 1 in.....	
1½ to 4 in. x 3-½ to 5-½ in.....	per lb. 2.20c
Rods—½ and 1½ round and square.....	per lb. 2.20c
Angles:	
3 in. x 1½ in. and larger.....	2.25c
3 in. x 3-½ in. and 4 in.....	2.50c
1½ to 2½ in. x 1½ in.....	2.25c
1½ to 2½ in. x 3-½ in. and thicker.....	2.50c
1 to 1½ in. x 3-½ in.....	2.45c
2½ x ½ in.....	2.55c
2½ x ½ in.....	2.65c
2½ x ½ in.....	2.70c
Tees:	
1 in.....	2.60c
1½ in.....	2.60c
1½ to 2½ x 1½ in.....	2.80c
1½ to 2½ x 3-½ in.....	2.90c
3 in. and larger.....	2.90c
Beams:	
Channels—3 in. and larger.....	2.25c
Hand—1½ to 6 x 3-½ to No. 8.....	2.45c
"Burden's Best" Iron, base price.....	3.25c
Burden's "H. B. & S." Iron, base price.....	3.05c
Norway Bars.....	3.50c

## Merchant Steel from Store—

Bessemer Machinery.....	per lb. 2.00c
Toe Calk, Tire and Sleigh Shoe.....	2.50c
Best Cast Steel, base price in small lots.....	2.00c
<b>Sheets from Store—</b>	
Black	
One Pass, C.R. R. G.	
Soft Steel. Cleaned.	
No. 16.....	per lb. 2.90c
Nos. 18 to 21.....	2.95c
No. 22 and 24.....	3.05c
No. 26.....	3.10c
No. 28.....	3.20c
Russia, Planished, &c.	
Genuine Russia, according to assortment,.....	per lb. 12 @14%
Patent Planished, W. Dewees Wood.....	per lb. A, 10c; B, 9c net.
<b>Galvanized.</b>	
Nos. 14 to 16.....	per lb. 3.20c
Nos. 22 to 24.....	3.35c
No. 26.....	3.75c
No. 28.....	4.10c
Nos. 20 and lighter 36 inches wide, 25% higher.	
<b>Genuine Iron Sheets—</b>	
<b>Galvanized.</b>	
Nos. 22 and 24.....	per lb. 5.75c
No. 26.....	6.25c
No. 28.....	7.25c

## Corrugated Roofing—

2½ in. corrugated, Painted	Galvd.
No. 24.....	per 100 sq. ft. \$3.85
No. 26.....	4.00
No. 28.....	4.90

## Tin Plates—

American Charcoal Plates (per box.)	
10, 14 x 20.....	\$.25
IX, 14 x 20.....	1.00

## A. Charcoal:

10, 14 x 20.....	\$.50
IX, 14 x 20.....	5.40

## American Coke Plates—Bessemer:

10, 14 x 20.....	\$.40
IX, 14 x 20.....	5.40

## American Terne Plates—

10, 20 x 28 with an 8 lb. coating.....	\$.50
12, 20 x 28 with an 8 lb. coating.....	10.50

## Bolts—

Common Carriage (cut thread):	
3/8 x 6 and smaller.....	70 & 71 1/2%
Larger and longer.....	65 & 5%

Common Carriage (rolled thread):	
3/8 x 6, smaller ands horter.....	70 & 12 1/2%
Phila. Eagle, \$3.00 list.....	80s 5c & 80s 10c

Bolt ends with C. & T. Nuts.....	
Machine (Cut Thread):	

3/8 x 4 and smaller.....	70 & 12 1/2%
Larger and longer.....	65 & 10%

## Nuts—

Cold Punched: Blank or Tapped.	Off list.
Square.....	4.90c
Hexagon.....	5.50c
Square, C. T. & R.....	5.30c
Hexagon, C. T. & R.....	6.10c
Hot Pressed: Square.....	Off list.
Hexagon.....	5.40c
Hexagon.....	5.80c

## Seamless Brass Tubes—

List November 13, 1908.	Base price 18¢
Brass Tubes, Iron Pipe Sizes—	Base price 18¢

Copper Tubes—	Base price 22¢
List November 13, 1908.	Base price 22¢

## Brazed Brass Tubes—

List August 1, 1908.	20¢ 60¢ per lb.
High Brass Rods—	

High Brass Rods—	15¢ 40¢ per lb.
Roll and Sheet Brass—	

Roll and Sheet Brass—	15¢ 40¢ per lb.
Brass Wire—	

Brass Wire—	15¢ 40¢ per lb.
Copper Wire—	

Base Price.	Carload lots mill 15¢ 40¢

## METALS—

### Tin—

Straits Pig.....	per lb. 36¢ 36 1/2¢
Copper—	

Lake Ingot.....	per lb. 14 1/2¢ 15¢
Electrolytic.....	per lb. 14 1/2¢ 15¢
Casting.....	per lb. 14 1/2¢ 15 1/2¢

Sheet Copper Hot Rolled, 16 oz (quantity lots) per lb. 18¢
Sheet Copper Cold Rolled, 16 oz advance over Hot Rolled.
Sheet Copper Polished 20 in. wide and under, 1¢ per square foot

Sheet Copper Polished over 20 in. wide, 2¢ per square foot.
Plated Copper, 1¢ per square foot more than Polished

### Spelter—

Western.....	per lb. 7¢ 6¢ 7 1/2¢
Zinc.	

No. 9, base, casks.....	per lb. 8 1/2¢ 1 Open.....
Lead.	

American Pig.....	per lb. 5 1/2¢ 5 1/2¢
Bar.....	per lb. 6 1/2¢ 6 1/2¢

1/2 & 1/2, guaranteed.....	per lb. 21 1/2¢ 22 1/2¢
No. 1.....	per lb. 18 1/2¢ 19 1/2¢

Refined.....	per lb. 16 1/2¢ 17 1/2¢
Prices of Solder indicated by private brand vary according to composition.	

## Bismuth—

## Aluminum—

No. 1 Aluminum (guaranteed over 99% pure), in ingot	per lb. 2.00¢ 2.25¢
for remelting.....	24¢

Rods & Wire.....	Base Price 33¢
Sheets.....	

## Old Metals.

Dealers' Purchasing Prices Paid in New York	Cont.
Copper, Heavy cut an crucible.....	per lb. 11.50¢ 11.75¢

Copper, Heavy and Wire.....	per lb. 11.00¢ 11.25¢
Copper, Light and Bottoms.....	per lb. 10.00¢ 10.25¢

Brass, Heavy.....	per lb. 7.75¢ 8.00¢
Brass, Light.....	per lb. 6.50¢ 6.75¢

Heavy Machine Composition.....	per lb. 10.50¢ 10.75¢
Clean Brass Turnings.....	per lb. 8.50¢ 8.75¢

Composition Turnings.....	per lb. 8.50¢ 8.75¢
Lead, Heavy.....	per lb. 3.75¢

Lead, Tea.....	per lb. 3.50¢
Zinc Scrap.....	per lb. 4.50¢

# THE IRON AGE-HARDWARE

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